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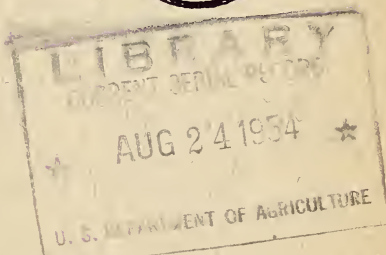
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U. S. DEPARTMENT OF AGRICULTURE
GRADUATE SCHOOL

1954-1955



*Education and Training
For Federal Employees*

UNDERGRADUATE, GRADUATE AND NON-ACADEMIC COURSES

WASHINGTON, D. C.

Calendar for 1954-55

FALL SEMESTER

Sept. 11-18	Registration (Late fee charged after Sept. 18)
Sept. 20-24	Classes begin
Oct. 1	Last day of registration for credit
	Last day of course transfer without late fee
Oct. 15	Deferred payments due
Oct. 22	Deadline for credit-audit change
Nov. 11	Veterans Day—no classes
Nov. 25	Thanksgiving Day—no classes
Dec. 20-31	Christmas holidays—no classes
Jan. 3	Classes resume
Jan. 21	Close of fall semester *

SPRING SEMESTER

Jan. 29-Feb. 5	Registration (Late fee charged after Feb. 5)
Feb. 7-11	Classes begin
Feb. 18	Last day of registration for credit
	Last day of course transfer without late fee
Feb. 22	Washington's Birthday—no classes
Mar. 4	Deferred payments due
Mar. 11	Deadline for credit-audit change
May 27	Close of spring semester *

SUMMER SESSION

June 6-11	Registration (Late fee charged after June 11)
June 13-17	Classes begin
June 17	Last day of registration for credit
	Last day of course transfer without late fee
June 24	Deferred payments due
July 4	Independence Day—no classes
July 8	Deadline for credit-audit change
August 19	Close of Summer Session *

* Classes which have missed sessions for any reason will continue until the deficiency is made up.

IMPORTANT

The provisions of this publication are not to be regarded as an irrevocable contract between the student and the United States Department of Agriculture Graduate School. The Graduate School reserves the right to change any provision or requirement at any time. The Graduate School further reserves the right at any time, to ask a student to withdraw when it considers such action to be in the best interests of the School.

GRADUATE SCHOOL

UNITED STATES DEPARTMENT OF AGRICULTURE

CATALOG

FALL — SPRING — SUMMER

1954 — 1955



*Please keep this catalog for use in
the Spring and Summer.*

This Catalog, published annually by the Graduate School, covers graduate and undergraduate programs for the Fall and Spring Semesters and the Summer Session. It is made as accurate as possible, but the right is reserved to make changes in details as circumstances require. A bulletin on correspondence study is available on request.

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General Information

PURPOSE OF THE SCHOOL

Since its establishment in 1921, the objective of the Department of Agriculture Graduate School has been to improve the Federal Service by providing needed educational opportunities for Federal employees. The Graduate School now offers a resident instruction program in Washington and a small correspondence program. In addition, it presents lecture series, offers educational counseling, contributes to training programs in the Department of Agriculture, and participates in cooperative programs with land-grant and other educational institutions. Graduate study is the primary interest of the School but it also offers an undergraduate program. Graduate School classes are open to all qualified employees of the Federal Government and to other qualified persons as facilities permit.

FOUNDING OF THE SCHOOL

The statute which established the Department of Agriculture in 1862 gave it the responsibility to "disseminate agricultural information in the broadest sense of the word." Thus from the beginning employees of the Department have been educators, and it soon became apparent that if they were to be successful they needed opportunities to continue their training while employed.

In 1898, Secretary of Agriculture Wilson expressed the need of the Department for an organization like the Graduate School, particularly to provide post-entry education for young scientists coming into the Department's research programs. No action, however, was taken at that time. Shortly after World War I, when the need for qualified personnel became acute throughout the government, the Congressional Joint Committee on the Reclassification of Salaries recommended that the government departments give more attention to the development of opportunities within the Federal Service for the continuing education of their employees. Accordingly, the Secretary of Agriculture appointed in 1920 a special committee to explore the matter. After considering the committee's findings and consulting leading educational institutions and other government agencies, the Secretary established the Graduate School in 1921 and announced at that time: "I believe those who may be able to avail themselves of this opportunity will both enrich themselves and enhance the value of the service they render."

ACCREDITED STANDING

The Graduate School does not grant degrees and has never sought that authority. It prefers to give courses of standard graduate and undergraduate grade; to have the merits of these courses judged by the well-known competence of its instructors; and to cooperate with institutions which have the authority to grant degrees.

The United States Civil Service Commission accepts Graduate School credits, for examination and qualification purposes, on the same basis as those from accredited colleges and universities.

ADMINISTRATION

The government of the Graduate School is vested in a General Administration Board appointed by the Secretary of Agriculture. The functions of this Board correspond in general to those of boards of trustees of universities. The School is administered by a director and a small administrative staff. It is a nonprofit institution and receives no Federal funds.

The evening program in Washington is organized into eight departments. Each department is directed by a departmental committee composed of an appointed chairman and others of recognized competence in the respective fields. These committees are responsible for organizing and giving general administrative direction to the programs and activities of the departments. Within the departments, depending on the scope and specialization of the programs are divisional committees. The eight department chairmen and the Director make up the Graduate School Council. Similar committees direct other Graduate School programs.

TEACHING AND RESEARCH RESOURCES

The Graduate School recruits its staff from scholars in the Federal Service. Many of the faculty members, in addition to government service, have taught in the colleges and universities throughout the country.

The Graduate School student body enjoys the use of the noted library and laboratory facilities of Washington. In addition to a large library in the Department of Agriculture, containing more than a half a million volumes on both agricultural and non-agricultural subjects, students have ready access to the rich storehouses of the Library of Congress, the Smithsonian Institution, and the National Archives. Supplementing the Department Library as necessary is a collection of books supplied directly by the Graduate School.

PUBLIC LECTURES AND SEMINARS

Lecture series on current problems give Department employees and others an opportunity to hear authorities discuss current problems in agriculture and in other national and world affairs. Lectures which are especially relevant to the needs and interests of Department employees are given during official working hours. Registration is not required and no fees are charged.

COOPERATION WITH THE UNIVERSITY OF MARYLAND

To provide broader educational opportunities for those served by each institution, the Graduate School of the United States Department of Agriculture and the University of Maryland have made a cooperative arrangement under which certain resources of each institution are made available to students of both institutions. Representatives of certain subject matter departments at each institution are engaged in organizing integrated educational programs.

Under these arrangements, work taken at the Graduate School of the United States Department of Agriculture may be applied as partial residence credit toward undergraduate or advanced degrees at the University of Maryland. Those wishing to take advantage of this arrangement must work out an approved program of study in consultation with appropriate officials at the University of Maryland. This should be done at a point as early as possible in their programs.

Graduate School students wishing to take advantage of these opportunities may secure instructions from the Registrar.

COOPERATION WITH BOSTON UNIVERSITY AND NEW YORK UNIVERSITY

The Graduate School has assisted Boston University since 1952 in the organization of programs of evening courses for the Federal employees in that metropolitan area. In 1953, the Graduate School began to assist New York University in the organization of similar programs. Announcements of these programs are available.

COOPERATIVE INTERNSHIP PROGRAM WITH LAND-GRANT INSTITUTIONS

Post-graduate and post-doctorate personnel in Land-Grant Colleges and Universities are afforded opportunities for research and for gaining other desirable experience under this program developed jointly by a committee from the Graduate Council of the Association of Land-Grant Colleges and Universities and the Graduate School. This work is under the direction of the Department of Agriculture professional staff in Washington, the Agricultural Re-

search Center and elsewhere. Specific arrangements under this program are between personnel from these educational institutions and agencies in the Department. Details may be had from the Office of Personnel or the Graduate School.

CERTIFIED STATEMENTS OF ACCOMPLISHMENT

Certified Statements of Accomplishment are offered in the fields of Accounting, Administrative Procedures, Agricultural Economics, Meteorology, Public Administration, and Statistics upon the student's completion of specified programs of study. Each student interested in earning a Certified Statement of Accomplishment in any of these fields should receive approval, from the Registrar, of his proposed program of study. For complete details see the outlined program in the Department concerned.

These statements are offered to encourage the student to complete a well-organized program in his chosen field of study or work. Each student who receives a certified statement also is given an informational transcript of his completed program which he may use as a public record of qualification. At the student's request, an official transcript is sent to an institution or agency designated by him.

SCHOLARSHIPS FOR FEDERAL ADMINISTRATIVE INTERNS

Each semester the Graduate School grants a limited number of scholarships, in the form of free tuition for one course, to persons who are participating in an official internship training program in one of the agencies of the Federal Government. Applications for these scholarships should be made by letter to the Registrar through an appropriate official in the agency in which the intern is training.

GRADUATE SCHOOL PUBLICATIONS

Publications of the Graduate School include:

1. A general annual *Catalog* which contains detailed information about the resident educational program in Washington, D. C.
2. Time Schedule and Supplement, published each semester—fall, spring and summer—which carries added details about the resident educational program in Washington.
3. Books and periodicals, published at irregular intervals containing: original contributions by faculty members; special lectures devoted to the advancement of the arts and sciences; and significant manuscripts prepared by employees of the Department of Agriculture, which the Department has been unable to publish. A partial list of these publications is given on the outside back cover of this *Catalog*.

CORRESPONDENCE PROGRAM

The small correspondence program of the Graduate School is designed primarily for the field employees of the Department of Agriculture, although the courses are open to others as the facilities permit. There are many other courses not offered by the Graduate School which are of interest to Department employees and are available through the correspondence programs of the colleges and universities throughout the country. The Graduate School is happy to assist a student to find courses in which he is interested.

The courses offered by the Graduate School are listed on page 106 of this *Catalog*. Students who wish more information about any of the courses or who wish to register in one of the courses may write to the Registrar, U. S. Department of Agriculture Graduate School, Washington 25, D. C.

Regulations and Procedures

ADMISSION

Admission to resident courses in the Graduate School is open to all qualified employees of the Federal Government, and to other qualified persons as facilities permit.

ENTRANCE REQUIREMENTS

Since the Graduate School does not offer degree programs, entrance requirements differ with the level of the course for which the student is registering.

Undergraduate courses, in general, are open to persons who are graduates of a standard high school or equivalent or who qualify for the course because of satisfactory work experience. For admission to more advanced courses college work in the same or related field is specified or understood. For other courses definite prerequisites may be stated. Year courses require the completion of the work of the first semester or its equivalent.

VETERANS

Graduate School courses are available to veterans under the provisions of Public Laws 346 and 16 as amended, and Public Law 550. Registration for part-time study is charged against educational benefits only in the proportion that the number of semester hours bears to a full normal load.

Veterans who are re-entering Graduate School classes after an interruption of training or who are entering the Graduate School for the first time are advised to consult the Registrar of the Graduate School sufficiently in advance of registration that a program may be determined and the necessary arrangements made with the Veterans Administration.

COUNSELING SERVICES

Officers of the Graduate School are available, throughout the registration periods and from 9:00 a.m. to 5:00 p.m. each day for counseling on educational plans, whether courses are to be pursued in the Graduate School or in other institutions. In addition, where necessary, arrangements are made to refer persons having special problems to authorities in the particular field of work or study.

TRANSFER OF CREDIT

Careful planning is important for any prospective student, but particularly so for the Federal employee who wishes to make a substantial beginning in his educational program through the Graduate School, where degrees are not granted and credits must eventually be transferred to a degree-conferring institution. A student cannot assume that credit for work done at the Graduate School will be accepted by any particular college or university. Universities generally accept transfers of credit on the basis of the individual courses taken, the student's over-all program, and the quality of the work done by the student.

The student who wishes to take an advanced degree should consult in advance the dean of the graduate school of the institution where he expects to become a candidate for his degree to secure approval for whatever portion of his program the institution of his choice will accept from the Graduate School. The student who is deficient in basic undergraduate courses needed as a foundation for his graduate program will find many of them available in the large undergraduate program of the Graduate School. Others may be found in local universities.

A student who is planning work toward an undergraduate degree should consult in advance the dean of the institution from which he expects to receive the degree if he wishes credit toward the degree for work taken at the Graduate School.

REGISTRATION

The registration period for each semester is shown on the School calendar on the inside front cover. A late fee per course is charged for registration after the opening of the semester. After the second week of classes in the fall and spring semesters, and after the first week in the summer session, students may register for credit only with the approval of the instructor and the Registrar. Registration is not completed until the required fees have been paid.

COURSE LOAD

Students employed full time may carry more than two courses only with the permission of the Registrar.

FEES

Course Fees. In general, fees are computed at \$10.00 per semester hour credit.

Late Fees. There is a \$2.00 per course late registration fee and a \$1.00 per course late transfer fee as shown in the School Calendar.

Reinstatement Fee. Students who fail to meet payments when due are charged a reinstatement fee of \$2.00 per course in addition to all accrued fees.

Laboratory Fee. Laboratory or materials fees are listed in the Schedule of Classes for each semester, in connection with the courses for which they are charged.

Service Fee. A fee of \$1.00 per course is charged each student using the deferred payment plan.

Transcript Fee. There is a 50¢ fee for each copy of a student's record on the regular Graduate School form or on the form of another institution or state board of education.

PAYMENT OF FEES

Fees are due and payable in advance at the time of registration. Registration is not complete and no student is permitted to attend classes until all fees have been paid.

An arrangement may be made at the time of registration for payment of fees in two installments, one half plus a service fee at the time of registration, and the balance by the end of the fourth week in the fall and spring semesters, and by the end of the second week in the summer session.

A student who fails to meet payments when due will be suspended and may not attend classes until he has been reinstated and has paid all accrued fees as well as a reinstatement fee of \$2.00 per course.

All fees are payable at the Graduate School business office, Room 1031, South Building, United States Department of Agriculture.

ATTENDANCE AT CLASSES

Students are expected to attend all class sessions and not to absent themselves without adequate reason.

Absences do not relieve the student from responsibility for work required while he was absent, and the burden of proof that the work was done rests with the student. In courses in which the work cannot be satisfactorily tested by written examination, the instructor shall be the judge of the relation of the student's attendance or non-attendance to his grade. A student registered for credit who is absent more than 25% of the class periods receives a mark of "W," withdrawn, unless he makes up all required work. Auditors who are absent more than 25% of the class periods receive the mark of "W."

CREDIT AND GRADES

Academic Credit. Persons registering for academic credit must satisfy all prerequisites for admission to the course as generally stated or specified in the course description.

Audit. An auditor must meet the same prerequisites as a credit student. He receives full privileges of class participation if he chooses to exercise them. An auditor does not receive a grade; he receives only a mark of AUD.

Change from Audit to Credit. A student may change his registration from audit to credit, or vice versa, within thirty days after the beginning of the semester in the fall and spring, and within three weeks after the beginning of the summer session. The request for change must be made in writing to the Graduate School. Special forms are available at the School office.

Grades. At the close of the semester students receive written notice by mail of grades received. The following letter grades are used:

A	Excellent
B	Good
C	Fair
D	Passable
F	Failure
Aud	Auditor
Inc	Incomplete
W	Withdrawn

TRANSCRIPT OF CREDIT

Inclusion in Personnel Record for Department of Agriculture Employees. To aid in effecting its promotion-from-within policy, the Department has provided (USDA Administrative Regulations, Title 8, Chapter 42, paragraphs 1548-1551, dated 10-13-48) that a record of Graduate School credits earned by its employees will be placed in official personnel files of the agency. Unless specifically requested by the employee that such action not be taken, the Graduate School will forward, upon completion of the courses or at the end of the year, a copy of the student's record, without cost to the employee, to the personnel officer of the administration, bureau or office in which the student is employed.

Certification on Request. Upon a student's written request and the payment of the transcript fee, an informational record will be sent to him, or an official transcript or informational record to an agency or institution designated by him. An official transcript will be sent only when the student has filed with the Graduate School a transcript of his previous academic work showing that he has met

all requirements for admission to the level of the courses for which he registered.

WITHDRAWAL AND REFUNDS

Application for withdrawal from Graduate School classes must be made in writing to the Registrar. A form for this purpose is available in the Graduate School Office. *Reporting the dropping of a course to an instructor does not constitute an official withdrawal.* Permission to withdraw will not be given to a student who does not have a clear financial record.

Refund of tuition fees only will be granted in cases of official withdrawal according to the following schedule:

<i>Fall and Spring Semesters</i>	<i>Refund</i>
During first and second weeks of term	Tuition less \$5.00 per course registration fee.
During third and fourth weeks of term	60% of tuition (a minimum of \$5.00 per course will not be refunded).
During fifth and sixth weeks of term	40% of tuition.
<i>Summer Session</i>	
During first week of session	Tuition less \$5.00 per course registration fee.
During second week of session	60% of tuition (a minimum of \$5.00 per course will not be refunded).
During third week of session	40% of tuition.

Refunds will be computed as of the date the application for withdrawal is received in the Graduate School Office. In no case will tuition be reduced or refunded because of non-attendance in classes. No refund will be made of laboratory or other incidental fees.

Since commitments for instruction and other arrangements are necessarily made in the beginning of the semester, no refunds for any reason can be made except in accordance with the above schedule.

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The Graduate School reserves the right to cancel any course if registration does not warrant continuance; to discontinue, postpone or combine classes; to change instructors; to change classroom assignments; to make any changes deemed advisable in registration and in fees; and to require the withdrawal of any student at any time for such reasons as the School deems sufficient.

Courses of Instruction

Courses given during the academic year 1954-55 are listed on the following pages by departments of instruction. The departments are listed alphabetically.

The words Fall, Spring and Summer indicate the semester in which the course is offered. The number of credits indicates the value of the course in semester hours. Bracketed numbers indicate courses which will not be given in 1954-55.

Courses numbered 1-100 are non-credit; 100-399, undergraduate; 400-699, advanced undergraduate (senior) and graduate; above 699, graduate only.

Biological Sciences

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—O—

Scientific efforts have been greatly intensified in recent years with the result that research discoveries have a direct bearing on the activities of every individual and organization. Many government workers in fields only indirectly related to biology often need an understanding of basic principles in the biological sciences to do a competent job in their own fields. On the other hand, government workers in the biological sciences are continually faced with the problem of keeping abreast of the rapid advances in the application of these principles and new gains in basic knowledge.

The Department of Biological Sciences has arranged a series of courses to meet the needs of each of these groups. Unless laboratory work is specified, the courses are non-laboratory. The advanced courses are taught as seminars. All of the courses are taught by outstanding specialists from Federal and other research institutions.

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1-126. Disease Classification and Medical Terminology

Fall, 2 credits

LOUISE BOLLO

Designed for medical secretaries, librarians, diagnosis coders, social workers, statisticians, and other workers in various health programs. Sources and meanings of the hundreds of disease entities encountered in hospital records, death certificates, causes of disability, etc. and the basic principles of disease classification. Helpful to persons who are interested in the tabulation and measurement of disease but who have not had a formal medical education.

1-300. Fundamentals of Entomology

Spring, 3 credits (alternate years)

REECE I. SAILER

An introductory course designed to provide the student with the basic elements of entomology. Recognition of the principal orders of insects and their important families is stressed. A study of the terminology and identification with the anatomical structure of insects. Attention is given to the biology of insects and to their phylogenetic and ecological relationships to other organisms. Lectures, discussion, laboratory and Saturday morning field trips. *Prerequisite:* Basic training in biology or consent of instructor.

1-310. The History of Biology

Year, 2 credits each semester

MORRIS C. LEIKIND

A lecture and discussion course on the historical foundations of modern biology. During the first semester the origins of the biological sciences from antiquity through the seventeenth century are considered. During the second semester topics discussed are the rise of the experimental method and the history of special problems such as the cell theory, evolution, heredity, and the germ theory of disease. The development of biology in the United States with special reference to the U. S. Department of Agriculture, the Smithsonian Institution and other Government agencies are studied. *Prerequisite:* One year of biological sciences or consent of the instructor.

1-320. Human Physiology

Fall, 3 credits

A. V. WOLFE

A course in the physiology of health and disease, consisting of lectures, lecture-conferences, and demonstrations. Emphasis is on function in muscle, peripheral nerve, special senses, central and autonomic nervous systems, heart and circulation, respiration, kidney, water and electrolyte balance, temperature regulation, thirst, digestive system, and basal metabolism.

1-427. Physiology of Bacteria

Year, 3 credits each semester

ARTHUR K. SAZ

The basic pathways of carbohydrate, protein, fat and amino-acid metabolism. Nutrition of microorganisms. Relationship to higher forms.

Topics covered also include biochemistry of nitrogen fixation, utilization of mutants for elaboration of metabolic pathways, and current status of modes of actions of antibiotics. *Prerequisite:* Organic chemistry or biochemistry or permission of instructor.

1-512. Medical and Veterinary Entomology

Year, 2 credits each semester (alternate years)

CARROLL N. SMITH

A timely general course in medical entomology with emphasis on the practical aspects of this important field. The biology, habits, and relation to disease of insects, spiders, mites, and ticks, are discussed. How these arthropods affect man and animals as intermediate hosts, or carriers of disease-producing organisms, is given attention and special consideration is given methods of control. The adaptation of known control procedures to present-day problems is considered. Features of the course include lectures by outstanding specialists in this general field and round-table discussions of practical problems. *Prerequisite:* Basic training in entomology or consent of instructor.

1-530. History of Physiology and Biochemistry

Spring, 2 credits

MORRIS C. LEIKIND

A survey of the development of physiology and biochemistry from the 17th century to modern times. Emphasis is placed upon the genesis of physiological and biochemical thought with emphasis on the rise of the experimental method. Among topics discussed are Harvey and the circulation, the physiology of respiration, photosynthesis, digestion and metabolism, the nervous system, the history of endocrinology, vitamins, theories on the origins of life, radiobiology and enzymology.

Designed for workers in physiological or biochemical laboratories or in administrative offices dealing with these subjects. *Prerequisite:* Bachelor's degree with a major in physiology or biochemistry (including nutrition and related subjects); or completion of course, History of Biology, or consent of the instructor.

1-570. Design of Experiments in Biological Sciences

Year, 2 credits each semester (alternate years)

E. J. KOCH

Principles of experimental design as applied to planning and analysis of plant and animal experiments. Problems in determining size of experiments, and selection of appropriate designs to meet objectives. Randomized block, latin squares, split plot, and incomplete block designs; their characteristics, uses, and analysis will be considered. Experimental and sampling errors, components of error, factorial arrangements, confounding, use of individual degrees of freedom and regression in analysis of variance will be studied in lecture and assigned problems. *Prerequisite:* A course in experimental statistics or familiarity with meaning and method of calculation of standard errors, correlation, regression and analysis of variance.

1-603. Advances in Plant Breeding and Genetics

Fall, 2 credits (every third year)

MARTIN G. WEISS and SPECIALISTS

Methods of breeding naturally self- and cross-pollinated plants, theories of early generation testing, nature and use of heterosis in plant breeding, techniques of self-pollination and hybridization, and plant improvement through interspecific hybridization and polyploidy. *Prerequisite:* Basic knowledge of genetics and plant breeding.

1-609. Recent Developments in Plant Physiology

Fall, 2 credits (alternate years)

MARION W. PARKER and SPECIALISTS

Discussion of recent investigations in plant physiology. Photosynthesis; growth regulation substances; the effect of light intensity and quality and varying photoperiods on growth and reproduction behavior of plants.

1-620. Recent Advances in Weed Control

Spring, 2 credits (alternate years)

WARREN C. SHAW and MARION W. PARKER

A presentation of theoretical and practical aspects of weed control in relation to agricultural economy, including classification, distribution, development, and destruction of weeds; the description and classification of herbicidal compounds; and control by mechanical, biological, and competitive cropping practices. Attention will be given to methods of weed control in field crops, horticultural crops, lawns and turf, and in special situations including non-agricultural lands, irrigation systems, etc. *Prerequisite:* A basic knowledge of plant physiology and organic chemistry or related subjects.

[1-702.] Radioisotopes and High Energy Radiation in Biology (1956-57 and every third year)

Spring, 2 credits

STERLING B. HENDRICKS and MERRILL E. JEFFERSON

1-705. Trematoda (Part III)

Fall, 2 credits

GEORGE R. LA RUE

A continuation of 1-625 Trematoda, concerned with more advanced aspects of the morphology, life history, and systematics of Trematoda with special emphasis upon the Digenetica. Lectures, laboratory work, demonstrations, and discussions. The course is based on Ben Dawes's *The Trematoda*. *Prerequisite:* Completion of 1-625 Trematoda, or consent of the instructor.

Languages and Literature

DEPARTMENTAL COMMITTEE

J. KENDALL McCLARREN (Chairman)

GEORGE E. BEAUCHAMP

LESTER A. SCHLUP

J. P. BLICKENSERFER

RALPH R. SHAW

ERWIN JAFFE

FRANKLIN THACKREY (Vice-chairman)

KENNETH W. OLSON

R. LYLE WEBSTER

IMPORTANCE OF ENGLISH, WRITING AND SPEECH

Among students preparing for technical careers and among busy people employed on the basis of their technical competence, there is an inevitable tendency to concentrate on subject-matter specialties. Technical knowledge is of no value, however, unless it can be communicated to others. It is common knowledge in the Government service and in industry that nothing so much retards the progress of many young technicians, scientists, and other professional personnel as their inability to write and speak effectively.

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ENGLISH—GRAMMAR AND WRITING

2-35. English for Secretaries—Rapid Review

Summer, non-credit

JAMES O. HARMON

A special eight weeks course given in three sections. Students may register for one or more sections. Section I: sentence structure; Section II: capitalization and punctuation; Section III: vocabulary and spelling.

2-85. Creative Writing

Summer, non-credit

SHERWOOD KING

Lectures on types of fiction and the study of techniques. Analysis of short stories. Writing of short stories or simpler forms of narration. *Prerequisite:* One year of college English or the equivalent.

2-95. Improving Reading Ability

Fall, non-credit. Repeated in Spring

MERRILL M. TAYLOR

A course to improve individual reading skills and techniques. Students are given training to increase their reading rate without loss in comprehension. Tachistoscope and silent reading films are used for group training with additional time for individual training with the reading accelerator. Course also includes ophthalmograph and telebinocular tests to determine eye movements and visual acuity.

2-112. Practical English Usage

Fall, 2 credits. Repeated in Spring and Summer

CHARLOTTE MANGOLD

VERNE L. SAMSON

KAY B. WEBER

This course enables students through practice to master the fundamentals of correct English. Troublesome problems of English usage, sentence structure, choice of words, style, and grammar, are studied as aids to clear and forceful writing of letters, memoranda, and reports.

2-113. Sentence Revision

Spring, 2 credits

VERNE L. SAMSON

Designed for students who wish to improve their writing. Review of the grammatical elements of the sentence, a study of established patterns of sentence construction, and constant practice in rewriting sentences. *Prerequisite:* Completion of Practical English Usage, or the consent of the instructor.

2-119. Vocabulary Building

Fall, 2 credits. Repeated in Spring and Summer

CHARLES D. MURPHY

Study of the sources and origins of words in order to gain insight into their present meanings. Principles of word formation; dictionary study and exercises in word selection. The course stresses the most common Latin and Greek roots used in forming English words.

2-222. English Composition

Year, 3 credits each semester

KATHRYN P. WARD
KAY B. WEBER

Equivalent of freshman English. An introductory course in writing and English usage, designed especially for those who need a course preparatory to more advanced English studies. Special attention given to the fundamental principles and mechanics of good writing—grammar, punctuation, spelling, diction, etc. Exercises in writing short and long themes and in studying, analyzing, and evaluating selected English prose texts.

2-223. Descriptive English Grammar

Fall, 3 credits. Repeated in Spring and Summer

SUSAN E. HARMAN

A course in the study of grammatical principles, stressing sentence structure and correct English form. Lectures on the history and development of inflectional and derivational forms. Exercises in diagramming and in analyzing examples of good and bad English.

2-224. Readable Writing

Fall, 2 credits

AMY G. COWING

Teaches you how to write so that more people will read and understand your articles and bulletins; how to estimate how easy or hard the reader will find your writing; how to organize your writing for easy reading. Deals briefly with the use of pictures and other visual aids to reading. Much of the course centers around use of the Flesch Readability Formula and consists of lectures and workshop sessions in which students make practical application of writing principles. *Prerequisite:* A course in English composition.

2-226. Introduction to Official Writing

Fall, 2 credits. Repeated in Spring

J. KENDALL McCLARREN, MARGUERITE GILSTRAP and VIRGINIA G. TATUM

This course covers the principles of clear statement which must be applied to all forms of writing. Emphasis is given to the special requirements of official writing in economic and scientific research, government organization, and policy. The course considers ways of making official writing clear, vigorous, and readable in spite of the necessary rules and restrictions. It is designed for people who are not professional writers but whose work calls for some copy preparation or report writing. One major writing project is required. *Prerequisite:* College freshman English or the equivalent in writing experience.

2-227. Workshop in Official Writing

Spring, 2 credits

J. KENDALL McCLARREN, MARGUERITE GILSTRAP and VIRGINIA G. TATUM

This course is a continuation of Introduction to Official Writing. The informal workshop approach is designed to meet the individual needs of students

whose work requires some writing. Writing principles developed in the previous course are applied to reports, scripts, releases, and other media. *Prerequisite:* Introduction to Official Writing or its equivalent.

2-235. Fiction Writing

Fall, 2 credits. Repeated in Spring

SHERWOOD KING

Stresses such fiction fundamentals as plotting, characterization, dialogue, story organization, testing readability and interest, and increasing dramatic quality of writing. Emphasizes writing techniques which increase salability of student manuscripts by discussing editorial taboos, ways to obtain salable story ideas, and methods of marketing manuscripts. *Prerequisite:* English Composition or equivalent, or permission of instructor.

2-242. Fiction Writing Workshop

Spring, 2 credits

OLGA MOORE ARNOLD

Discussion, criticism and suggestions for revising student manuscripts. Emphasizes methods of slanting for particular markets, discussions of what editors buy and why, and ways to polish manuscripts to increase sales possibilities. *Prerequisite:* Fiction Writing or equivalent.

2-280. Feature Writing

Fall, 2 credits

DUNCAN N. SCOTT

Stresses how to find article ideas, how to do the research necessary to develop them into salable articles, best methods of presentation of material, ways to polish writing to make it more salable, ways to determine magazine needs, how to slant material for particular magazines, and how to test readability and interest of writing. *Prerequisite:* English Composition or equivalent, or permission of instructor.

2-281. Feature Writing Workshop

Spring, 2 credits

DUNCAN N. SCOTT

Discussion, criticism and suggestions for revising student manuscripts. Emphasizes methods of slanting for particular markets, discussions of what editors buy and why, and ways to polish manuscripts to increase sales possibilities. *Prerequisite:* Feature Writing or equivalent.

2-450. Workshop in Technical Writing

Fall, 2 credits

MARGUERITE GILSTRAP and MAURICE FRIED

A course designed to help scientists and economists improve their research reports and articles for professional publications. The first 3 weeks are devoted to a survey of the fundamentals of writing the scientific report: its characteristics, parts, functions, the steps in preparation, the process of criticism. The remainder of the term is spent in the preparation, criticism, and revisions of reports and articles—written for official use when possible. *Prerequisite:* Undergraduate degree in one of the sciences, engineering, economics, or similar technical field.

LITERATURE

2-330. Great Books I

Year, 2 credits each semester *

M. CLARE RUPPERT

Group discussion, under leadership, of important works in poetry, history, philosophy and criticism. The leader will try to help with the reading and understanding, but the books themselves will be the teachers. The intention of the course is to give insight into perennial, and therefore contemporary, problems, not historical and literary information. The only qualifications required are an interest in ideas and belief in free discussion. With few exceptions the

books will be read in their entirety. One, two, or three meetings will be given to a book depending upon its length. Discussion will center around the following authors:

Fall Semester: Bible, *Book of Job*; Homer, *Odyssey*; Sophocles, *Oedipus Rex*, *Antigone*; Plutarch, *Lives: Alexander and Caesar*; Plato, *Apology* and *Crito*; Plato, *Republic*, books 4-6; Aristotle, *Politics*, *Ethics*; Marcus Aurelius, *Meditations*; St. Augustine, *Confessions*; St. Thomas Aquinas, *On the Law*.

Spring Semester: Bible, *Gospel of St. John*; Dante, *Divine Comedy*; Machiavelli, *the Prince*; Montaigne, *Selected Essays*; Shakespeare, *King Lear*, *Hamlet*; Rousseau, *Social Contract*; *Federalist Papers*; Goethe, *Faust*; Marx, *Communist Manifesto*; Veblen, *Theory of Leisure Class*; Adams, *Education of Henry Adams*.

2-332. Great Books II

Year, 2 credits each semester * (Not offered in 1954-55) JOHN T. CHENEY

Group discussion, under leadership, of works of the authors listed. While the leader will endeavor to help with the reading and understanding, the books themselves may be considered the teachers. The intention is to give insight into perennial, and therefore contemporary, problems, not historical and literary information. The central theme of the Fall semester is the relationship of fact and information; of the Spring term, individual freedom and responsibility to society. Qualifications required are an interest in ideas, and belief in free discussion; it is in addition urged that the students have completed Great Books I. Authors to be read include:

Fall Semester: Thucydides, *History of the Peloponnesian War*; Aristophanes, *Lysistrata*; Aeschylus, *Agamemnon*; Euripides, *Medea*; Hobbes, *Leviathan*; Plato, *Phaedo*; Milton, *Areopagitica*; Aristotle, *Poetics*; Plato, *Symposium*; Cervantes, *Don Quixote*.

Spring Semester: Kant, *Fundamental Principles*; Ibsen, *Master Builder*, *Wild Duck*, *Ghosts*; Xenophon, *Persian Expedition*; Lucretius, *On the Nature of Things*; Tawney, *Religion and the Rise of Capitalism*; Sophocles, *Oedipus at Colonos*.

2-334. Great Books III

Year, 2 credits each semester * (alternate years) JOHN T. CHENEY

For students who have completed Great Books I or II or a similar course in Great Books, and who wish to go on with their readings. This course is given alternately with Great Books II.

Readings for 1954-55 will be selected from the following: Herodotus, *History of Egypt*; Plato, *Meno*; Aeschylus, *Prometheus*; Euclid, *Elements*; Gibbon, *Decline and Fall*, Chapters 15, 16; Milton, *Paradise Lost*; Dante, *Inferno*; St. Thomas Aquinas, *Selections*; Swift, *Gulliver's Travels*; Shakespeare, *Macbeth* or *King Lear*; Thoreau, *Civil Disobedience*; Freud, *General Introduction*; Mark Twain, *Huckleberry Finn*; and William James, *Selections*. *Prerequisite*: At least one semester of Great Books I or II.

* Students may attend both semesters or either semester.

INFORMATION METHODS

2-220. Indexing

Fall, 2 credits

MABEL H. DOYLE

This course is intended primarily for those interested in making indexes for periodicals, bulletins, reports, and books. Emphasis will be placed on general procedures and matters of policy as well as on basic principles and techniques.

2-225. Principles of Editing and Their Application

Fall, 3 credits

ROY E. MILLER and GENIANA R. EDWARDS

Intended primarily for those seeking information on editorial techniques involved in handling manuscripts after they leave the author's hands and until they are issued in printed form. Discussion of the fundamental principles of editing, including the organization or rearrangement of material for effective presentation; rhetorical style in relation to subject matter; word forms, sentence structure and effective use of English; the Style Manual of the Government Printing Office; considerations governing titles, tables of contents, headings, footnotes, illustrations, literature citations and bibliographies, and statistical checking; the principles of table formation and arrangement; the relation of type to subject matter and the techniques of printing; and the fundamentals of indexing and proofreading. Opportunity is afforded to apply these principles in practical work in editing, which is then discussed in class. A trip to the Government Printing Office is arranged to note and study operations there.

2-237. Government Printing Procedure

Spring, 2 credits

Instructor to be announced

Intended for those who plan, prepare, or procure printing, duplicating, and distribution of books, pamphlets, folders, posters, charts, forms and other printed or duplicated matter. Subjects covered include: analysis of manuscript copy and its purpose to determine format and method of production; organization of copy for effectiveness; copy fitting and measuring; ways to aid the reader to grasp the message of the printed word; legibility and readability; type faces and typography; illustrations; printing and duplicating processes and criteria for their use; paper; binding methods; preparation of copy for duplicator and printer; handling of proofs; specifications and cost factors; and channels and methods of distribution of Government publications. The knowledge of methods and procedures to be acquired from this course is intended to give the student competence and confidence in dealing with author and editor, and printing, duplicating and distribution technicians.

2-240. Audio-Visual Aids in Information and Education

Fall, 2 credits

GALE GRISWOLD

A survey of the many ways audio-visual aids can be used in training, employee relations, and information and education programs. Covers not only newer materials such as motion pictures, filmstrips, and recordings, but also modern uses of photographs, charts, graphs, maps, and the like—even the art of using a blackboard. Gives practical suggestions on the most effective use of these aids for different purposes—developing physical skills, imparting information, changing attitudes, and otherwise influencing human behavior. Lectures and demonstrations with guest speakers presenting material on special topics. Each student will have the opportunity to choose his own problem for intensive study.

2-065. U. S. Government Films and Film Services—Seminar

Fall, non-credit

SEERLEY REID and R. LYLE WEBSTER

Series of 10 lectures, with followup discussion, on methods and problems in the production, distribution, and use of motion pictures by Government agencies. Topics include historical review, legislative provisions, archival and reference services, overseas use of films, procurement methods and production procedures, film use in Government personnel and training programs (military and civilian), methods of distribution to the public, evaluation. Lecturers will be especially chosen for each topic.

Registration is required but no fees are charged.

2-360. Advanced Practice in Editing

Spring, 3 credits

GENIANA R. EDWARDS and SPECIALISTS

Advanced instruction in literary and statistical editing and handling of graphic materials. Students will edit a practice manuscript requiring reorganization, extensive editing, and uniform styling. Several Government agency styles for citation, tables, graphics, and other details will be compared, and adaptation of style meeting special requirements yet conforming to Government Printing Office rules will be studied. Administrative procedures for work on pamphlets, magazines, etc., will be outlined. *Prerequisite:* Principles of Editing and Their Application, or consent of instructor.

2-365. Editing Technical Manuscripts

Year, 2 credits each semester

R. T. HALL

Editorial evaluation of technical manuscripts, and remedies if required, as to: selection of audience; need for publication (Government or non-Government); orientation of the study; over- or underemphasis on review of literature, description of methods and physical characteristics of the study and its environment; form of presentation of data; proper functions of charts, other drawings, photographs, tables, appendixes, bibliographies. Discussion and interpretation of data. Adequate support of conclusions and recommendations, and their applicability by the defined audience. Removing internal disagreements. Suitable tone in presentation, and balance between parts of report. *Prerequisite:* Principles of Editing and Their Application, or equivalent experience.

LIBRARY TECHNIQUES

The following courses are designed as non-professional library courses, offering a background of information and training for the sub-professional library assistant and other persons whose work requires a knowledge of these techniques, such as teachers, research assistants, etc. Students may take the courses in any sequence.

2-135. Introduction to Cataloging and Classification

Spring, 2 credits

Instructor to be announced

The philosophy of organization of the materials of communication; typical rules for descriptive and subject cataloging; the coordinate index and other forms of indexing; the structure of systems of classification; the Library of Congress system of classification.

2-136. Principles of Library Organization

Spring, 2 credits

JOSEPH T. POPECKI

The system and function of a library based on its component parts and services which obtain regardless of size or purpose; the organization of function and service for utmost efficiency.

2-137. Basic Reference Service and Reference Tools

Fall, 2 credits

Instructor to be announced

The process of satisfying intellectual inquiry; sources of information; study and comparison of a basic list of 150 reference tools with the exception of general bibliography.

2-138. Introduction to Bibliographic Science

Fall, 2 credits

JOSEPH T. POPECKI

Bibliographic science and bibliographic style for beginners; variations and forms of bibliography; study and comparison of the general bibliographic tools and indexes of chief importance.

SPEECH

2-228. Fundamentals of Speech

Fall, 2 credits. Repeated in Spring and Summer

VIRGINIA B. ROSER
GORDON D. BRIGHAM

Through the preparation and delivery of short original speeches the student gains poise, assurance, and the ability to express himself clearly and accurately. Strict adherence to time limit quickens mental processes and develops discrimination in the selection of speech material. Voice, articulation, and pronunciation drills. Posture, movement, and gesture. Learn to speak by speaking at each class meeting. Constructive criticism.

2-229. Public Speaking

Spring, 2 credits

GEORGE E. BEAUCHAMP

Students enrolling for this course should have had Fundamentals of Speech or some speech-making experience. Emphasis is placed on determining what one's purpose is in speaking, and accomplishing that purpose effectively. How to be interesting and clear, how to develop and support ideas, and how to handle discussion. Each student speaks and receives personal speech suggestions at each class meeting.

2-232. Voice and Remedial Speech

Fall, 2 credits

WALTER B. EMERY
L. POE LEGGETTE

Study and intensive drills in voice production, flexibility, range, articulation, and enunciation. Training and practice are designed to improve vocal conditions for all speech purposes and to remedy minor speech difficulties. In order that students may receive more individual attention, registration is limited to twenty.

2-234. Correction of Speech Dialect

Spring, 2 credits

WALTER B. EMERY
L. POE LEGGETTE

Designed for persons having local or foreign dialect wishing to acquire standard American pronunciation and speed; intensive phonetic studies and drills to help the student hear properly and produce correctly American speech sounds and to avoid deviations therefrom; special reading and speaking exercises to improve diction and conversational ability; training is designed to serve individual needs.

2-350. Conference Methods and Procedures

Spring, 2 credits

GEORGE E. BEAUCHAMP

For persons who take part in formal or informal meetings either as chairmen, leaders, or participants. How to develop and work within an effective agenda, stimulate profitable discussions and arrive at worthwhile and equitable conclusions. How to develop and express one's point of view effectively in discussion.

2-355. Parliamentary Procedure

Fall, 2 credits

GEORGE E. BEAUCHAMP

Principles and practices of parliamentary procedure. Designed for persons who work with organizations which use these principles in the conduct of meetings.

2-400. Persuasive Speaking

Fall, 2 credits

GEORGE E. BEAUCHAMP

Intended for persons who have had one or both of the courses, 2-228 and 2-229, or their equivalent in speaking experience. Special attention is given to

outlining and organizing speech materials, to developing interesting speech style, and to studying the techniques of influencing people's belief and behavior. Among the topics studied are emotion, rationalization, stereotypes, prejudice, and the will-to-believe.

FOREIGN LANGUAGES

The Graduate School provides opportunities for instruction in a wide range of foreign languages. The person who is seeking the maximum practical value from a foreign language must learn not only to translate it but to think in it well enough for translation to be unnecessary. It is the aim of those responsible for these courses to conduct them so as to develop in their students a ready and intelligent use of the language.

FRENCH

2-68. Reading French

Summer, non-credit

WILFRED GROSJEAN

A course designed for those who need a reading knowledge of French in their work or in order to meet language requirements for an advanced degree. Also helpful to those who wish to improve their general reading knowledge. No previous study of the language is required.

2-87. French for Travelers

Spring, non-credit. Repeated in Summer

GERMAINE BARGIN

Acquiring a facility in the use of oral French, including practical, every-day expressions helpful to those who plan a trip to France or to those who plan to work in a French-speaking country. For persons with or without previous study of the language.

2-253. Elementary French

Year, 3 credits each semester

JACK C. ARNOULD

GERMAINE BARGIN

MARGUERITE ETIENNE

Provides basic knowledge of French grammar and vocabulary. Reading, translation, dictation, and some conversation. The teaching of the proper pronunciation is stressed. For beginners.

2-254. Intermediate French

Year, 3 credits each semester

JACK C. ARNOULD

Systematic review of French grammar. Writing of French composition, reading, translation, dictation, conversation. For students who have had one year of college French, or two or three years of average grammatical preparation below college level.

2-255. French Conversation

Year, 2 credits each semester

MARGUERITE ETIENNE

Designed to develop in students a fluent style of idiomatic conversation on topics most likely to be met in travelling in French speaking countries. Grammar review only if deemed necessary. Some composition and dictation exercises. Reading of current French newspapers and magazines. *Prerequisite:* Two years of college French or the equivalent; a good knowledge of grammar and a sizeable vocabulary.

GERMAN

2-66. Reading German

Fall, non-credit. Repeated in Spring

MARIANNE LEDERER

A course designed for those who need a reading knowledge of German in their work or in order to meet language requirements for an advanced degree. Vocabulary emphasis depends on needs of the students registered. No previous study of the language is required.

2-88. German for Travelers

Fall, non-credit. Repeated in Spring and Summer

MAGNA E. BAUER
JOSEPH PONTI

Accuracy and facility in the use of oral German through listening to spoken German, reading, word analysis, and particularly repetition of the "basic thousand words" in round-table conversation. Work will be adapted to the members of the class. The beginner will have a chance to acquire a working vocabulary; the more advanced student will have an opportunity to practice the correct use of words, phrases, and idiomatic expressions. For beginners in the language as well as those who have had one year or more of German.

2-259. Elementary German

Year, 3 credits each semester

MARIANNE LEDERER
JOSEPH PONTI

Essentials of German grammar. Reading and writing simple prose. Introduction to extensive reading. Some conversation. Training in the fundamentals required to go on to Intermediate German.

[2-260.] Intermediate German (1955-56 and alternate years)

Year, 3 credits each semester

MARIANNE LEDERER

2-261. German Conversation

Year, 2 credits each semester

MAGNA E. BAUER

Development of facility in discussion and reading, use of idioms, writing and thinking in the language. *Prerequisite:* Two years of college German, or the equivalent.

ITALIAN

2-270. Elementary Italian

Year, 3 credits each semester

JOSEPH PONTI

Essentials of Italian grammar. Reading and writing simple prose. Introduction to extensive reading, some conversation.

[2-271.] Intermediate Italian (1955-56 and alternate years)

Year, 3 credits each semester

JOSEPH PONTI

PORTUGUESE

2-290. Elementary Portuguese

Year, 3 credits each semester

JACOB ORNSTEIN

Basic grammar and vocabulary. Reading, translation, conversation. For beginners.

RUSSIAN

2-45. Review of Elementary Russian

Summer, non-credit

GEORGE M. SAHAROV

General review of Russian grammar, accompanied with oral and written exercises. *Prerequisite:* A year course in elementary Russian, or the equivalent as approved by instructor.

2-295. Elementary Russian

Year, 3 credits each semester

GEORGE M. KORENEV ROCKWELL

GEORGE M. SAHAROV

EUGENIA TARAKUS

Designed to give the student a sound foundation in basic Russian. Includes reading, writing, and speaking of Russian. Special attention is given to the fundamental rules of Russian grammar, Russian phonetics, and the mechanics of good reading and writing. The first semester covers the first 18 lessons of the textbook, "Bondar's Simplified Russian Method, Seventh Edition," and the second semester covers the second 18 lessons. Students should have a good knowledge of English grammar.

2-296. Intermediate Russian

Year, 3 credits each semester

GEORGE M. SAHAROV

Reading and translation, grammatical analysis, dictation and conversation in Russian. *Prerequisite:* One year of Russian which included the completion of a basic grammar text, Bondar or the equivalent.

2-297. Conversational Russian

Year, 3 credits each semester

GEORGE M. SAHAROV

This course is alternated with Advanced Russian, depending upon student demand. For students who have had at least two years of Russian language training.

2-299. Advanced Russian

Year, 3 credits each semester

GEORGE M. SAHAROV

Reading and translation of more advanced Russian texts, composition in Russian, oral and written translation from English to Russian. Conversation. *Prerequisite:* Two years of Russian.

SPANISH

2-73. Commercial Spanish

Summer, non-credit

ODILON PONCE

For persons preparing for a position as bilingual executive or secretary in Pan American Organizations or offices in Spanish speaking countries. Thorough practice of office vocabulary, writing of letters, drafting of memos. Translations from and to both languages. Commercial vocabulary for business or industry employment. *Prerequisite:* Ability to read and understand Spanish.

2-89. Spanish for Travelers

Fall, non-credit. Repeated in Spring and Summer

ODILON PONCE

Acquiring a facility in the use of oral Spanish, including practical, every-day expressions helpful to those planning a trip to a Spanish-speaking country. For persons with and without previous study of the language.

2-300. Elementary Spanish

Year, 3 credits each semester

ERWIN JAFFE
MARJORIE C. JOHNSTON

Foundation work in grammar, vocabulary, reading, and translation.

2-301. Intermediate Spanish

Year, 3 credits each semester

FERNANDO R. ROMERO

Grammar review, more difficult reading and translation, use of idioms, writing and discussion in the language. *Prerequisite:* One year of Spanish at college level, or two or three years below college level.

2-302. Spanish Composition and Conversation

Year, 2 credits each semester

G. MEDRANO DE SUPERVIA

Thorough training in the structure of the language, through reading and discussion of Spanish newspapers, magazines and novels of today. Writing of compositions, commercial and familiar letters; helping student acquire ability to speak and understand everyday and colloquial Spanish. *Prerequisite:* Intermediate Spanish or equivalent.

2-574. Advanced Spanish Conversation and Literature

Year, 2 credits each semester

RAFAEL SUPERVIA

Especially adapted for those having a fair knowledge of the Spanish language, who want to improve it by the readings of and comments on the masters of Spanish literature. *Prerequisite:* Ability to read, understand, and express oneself clearly in Spanish.

Mathematics and Statistics

DEPARTMENTAL COMMITTEE

B. R. STAUBER (Chairman)

JOSEPH F. DALY
HAROLD F. DORN

MARGARET J. HAGOOD
MORRIS H. HANSEN

EARL E. HOUSEMAN

THE STATISTICIAN AND HIS EDUCATION

Unprecedented dependence is being placed on statisticians by administrative officials in government and private business all over the world. The statistician, through his specialized training, is able to provide current and comprehensive information on many subjects, and to do so with speed and economy. His specialized techniques are indispensable in industry.

The making of a statistician is a long and exacting process—several years of graduate study, plus at least a year and a half of high-grade experience under competent leadership. Educational facilities are strained, not only because of the heavy and increasing demand but also because the educational requirements placed on the statistician today are of an entirely different order of magnitude than they were a few years ago.

The courses described on the following pages accordingly provide training not only in theoretical principles, but training also in the administrative and research uses of data, as well as in the collection and processing of data and in the development and supervision of the minor skills necessary for carrying out statistical work.

In the design of a survey the statistician is concerned with the reliability and the cost of the figures that are to be obtained. Reliability is affected by many sources of error, which can be classified under two groups: (a) biases that are common to both complete counts and samples; (b) sampling errors. A thorough understanding of both types of error is essential in the work of the statistician. The statistical courses listed on the following pages deal mainly but not entirely with sampling errors. Proficiency in one or another branch of subject-matter such as sociology, economics, agricultural science, engineering, or some other specialized field, is essential for a full appreciation of the first type of error and for that reason collateral studies in one or more fields of science are advised and in fact are insisted upon in work leading to a Certified Statement of Accomplishment in Statistics.

INTERNSHIPS IN SAMPLING

COMMITTEE

B. R. STAUBER (Chairman)

WILLIAM G. COCHRAN

MORRIS H. HANSEN

STERLING R. NEWELL

S. MCKEE ROSEN

IRVING SIEGEL

FREDERICK F. STEPHAN

ARYNESS JOY WICKENS

In recognition of the need for statisticians with thorough theoretical training and with experience in large-scale statistical projects under competent leadership, and in recognition of the exceptional facilities in Washington for specialized training in this field, the Graduate School has undertaken to present to qualified students the opportunity to pursue their studies under a system of internships. Under this program a limited number of qualified persons have a unique opportunity to combine advanced study with practical experience in sampling.

Internship Program

The internships provide opportunity for research work under leading authorities. The program is planned on an individual basis, depending on the experience, training and interests of the candidate. The internships are intended to supplement, not supplant, work offered in universities.

The following agencies have cooperated in the program:

Bureau of Agricultural Economics	Bureau of the Census
Bureau of the Budget	Bureau of Labor Statistics
National Bureau of Standards	National Institutes of Health
	National Office of Vital Statistics

The internship consists of two integrated parts:

- (1) classroom training in courses at the Graduate School or at other educational institutions in the city;
- (2) work experience in government agencies on large-scale statistical sampling and testing programs.

Length: Twelve or eighteen months; the length of time spent in the internship is determined by the training and experience of the applicant.

Qualifications: Doctorate (a) in mathematical statistics, or (b) in a field such as agriculture, business, economics, social psychology, engineering. By arrangement, an intern may combine his internship with work on a doctoral thesis.

Selection

Each application is reviewed and approved or rejected by the Committee on Internships in Sampling. The Committee helps the intern plan his program and consults with him from time to time concerning his progress. Where the intern program is being developed as a research project, serving as a basis for a doctoral dissertation, the Committee keeps the university informed of progress.

Stipends

The internships carry no stipends. The Graduate School makes and offers no living arrangements.

Fees

The only fees charged are nominal course fees for those courses in which the intern is registered.

Application

Address the application to the Director, Graduate School, Department of Agriculture, Washington 25, D. C., and include the following information:

- | | |
|---|---|
| (1) Name | (5) Fields of specific interest and |
| (2) Date and place of birth | circumstances surrounding |
| (3) Transcripts of previous academic work | application (i.e., purpose, whether applicant would devote full time to internship, etc.) |
| (4) Citations or copies of publications or technical papers | |

Applications should be submitted well in advance of the beginning of the fall semester in September to insure adequate arrangement of work schedules and course programs.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN STATISTICS

A Certified Statement of Accomplishment is offered in each of three fields of statistical study—fields representing areas of statistical preparation and application most useful in the public service. The required program in each field is outlined on page 33. The student who holds a bachelor's degree and who completes the basic courses and earns 24 credits in specialized courses listed in any column, with substitutions only as specifically approved, is eligible to receive a Certified Statement of Accomplishment. It certifies that the student has completed a program of study which, in conjunction with collateral training in a subject-matter field of application, prepares him for effective public service in a particular statistical field.

COURSES LEADING TO CERTIFIED STATEMENTS OF ACCOMPLISHMENT IN STATISTICS

(With Concentration in One of the Following Fields of Application)

THE SOCIAL SCIENCES

THE NATURAL SCIENCES

MATHEMATICAL STATISTICS

BASIC COURSES—Required of all candidates

College Algebra, Plane Trigonometry, and Analytic Geometry
Principles of Statistical Analysis

College Algebra, Plane Trigonometry, and Analytic Geometry
Calculus
Principles of Statistical Analysis

SPECIALIZED COURSES

3-206. Calculus
3-400. Introduction to Mathematical Statistics
3-415. Higher Algebra
3-435. Sampling in Social and Economic Surveys
or
3-735. Theory of Sample Surveys
3-436. Questionnaire Construction and Interviewing
3-437. Market and Opinion Research Methods
3-520. Government Statistics
3-710. Multivariate Analysis

3-206. Calculus
3-400. Introduction to Mathematical Statistics
3-405. Introduction to Experimental Statistics
3-507. Statistical Methods in Engineering
3-535. Statistical Techniques in Biometry and Medicine
3-571. Design, Philosophy, and Interpretation of Experiments
or
1-570. Design of Experiments in Biological Sciences

3-400. Introduction to Mathematical Statistics
3-415. Higher Algebra
3-430. Unified Mathematics
3-500. Advanced Calculus
3-710. Multivariate Analysis
3-712. Theory of Functions
3-735. Theory of Sample Surveys
3-748. Introduction to Mathematical Analysis
3-751. Theory of Measure
3-752. Advanced Theory of Probability

ELECTIVE COURSES

3-420. History of Mathematics
3-430. Unified Mathematics
3-500. Advanced Calculus
3-502. Differential Equations
3-532. Introduction to Linear Programming

3-533. Introduction to Operations Research
3-571. Design, Philosophy, and Interpretation of Experiments
3-712. Theory of Functions
3-748. Introduction to Mathematical Analysis
3-752. Advanced Theory of Probability

MATHEMATICS

3-1. Review of Freshman Mathematics

Spring, non-credit

GEORGE G. O'BRIEN

A review course at the level of freshman mathematics. Algebra, trigonometry, analytic geometry. A brief introduction to the methods of the differential calculus. Emphasis on applications to statistical problems. *Prerequisite:* One year of college mathematics.

3-102. College Algebra

Fall, 4 credits. Repeated in Spring and Summer

HOWARD EDELSON

Fundamental rules of algebra; exponents; logarithms; manipulations with proportions; identities and conditions; solution of equations; binomial theorem; numerical approximations. Uses of symbolic operators. Elementary determinants; solution of equations by the reciprocal matrix. Theory of equations; progression; series. Permutations and combinations. Graphical methods. Emphasis on applications to statistics and the physical sciences. *Prerequisite:* High school algebra and plane geometry.

3-103. Trigonometry and Analytic Geometry

Spring, 4 credits

HOWARD EDELSON

Basic definitions and uses of trigonometric functions; logarithmic solutions; radian measure; fundamental identities; oblique triangles; polar coordinates, inverse trigonometric functions; complex numbers and De Moivre's theorem; graphs of the functions and the inverse functions; introduction to spherical trigonometry.

Fundamental concepts and formulas; line, circle, parabola, ellipse, hyperbola; transformation of coordinates; polar coordinates; parametric equations, the second and higher degree equation in rectangular coordinates; graphic solution of equations; introduction to solid analytic geometry. *Prerequisite:* College algebra.

3-104. Trigonometry

Summer, 2 credits

Instructor to be announced

Basic definitions and uses of trigonometric functions; logarithmic solutions; radian measure; fundamental identities; oblique triangles; polar coordinates, inverse trigonometric functions; complex numbers and De Moivre's theorem; graphs of the functions and the inverse functions; introduction to spherical trigonometry. *Prerequisite:* College algebra.

3-206. Calculus

Year, 4 credits each semester

JOSEPH H. KUSNER

First semester: Variables, functions, limits, continuity, derivatives. Applications of the derivative to geometry and physics. Maxima and minima. Differentials. Mean value theorem. Simple integration and applications to geometry and physics. Radius and circle of curvature. Vectors.

Second semester: Standard integral forms. Special methods of integration. Approximate integration. Improper integrals. Indeterminate forms. Taylor's formula with remainder. Infinite series. Partial derivatives. Multiple integrals. *Prerequisite:* Algebra, trigonometry and analytic geometry.

3-415. Higher Algebra

Fall, 3 credits

OTIS E. LANCASTER

Permutations and combinations, elementary probability, binomial and multinomial theorems. Theory of equations. Matrices, linear independence, ortho-

gonality, partitioned matrices, and determinants; quadratic forms, linear transformations, latent roots of a matrix and characteristic function; numerical evaluation of determinants and solution of equations. *Prerequisite:* College algebra, trigonometry, and analytic geometry.

[3-420.] History of Mathematics (1955-56 and alternate years)

Year, 3 credits each semester

DANIEL M. DRIBIN

3-430. Unified Mathematics

Year, 3 credits each semester

Instructor to be announced

This course introduces the student to three basic ideas which have played an important part in unifying modern mathematics, namely, groupings, mappings, and spaces. Among the topics covered are the relationship of geometry to groups of transformations; the Euclidean plane and the projective plane considered as abstract spaces; other associated topological spaces such as the Moebius Strip and the Klein Bottle; the role of groups of mappings in the classification of such spaces and the central position of the notion of spaces and mappings in such concepts as convergences and continuity. *Prerequisite:* Calculus.

[3-500.] Advanced Calculus (1956-57 and every third year)

Year, 2 credits each semester

H. H. GERMOND

[3-502.] Differential Equations (1955-56 and every third year)

Year, 2 credits each semester

OTIS E. LANCASTER

3-602. Partial Differential Equations

Summer, 3 credits (every third year)

GEORGE G. O'BRIEN

Linear equations of the first and higher orders; non-linear equations of the first and higher orders; systems of partial differential equations and their solutions; introduction to Fourier Series; numerous applications primarily in physics. *Prerequisite:* Calculus and differential equations.

3-712. Theory of Functions of a Complex Variable

Year, 2 credits each semester (every third year)

H. H. GERMOND

Algebra and geometry of the complex plane, derivatives, and the Cauchy-Riemann equations; conformal representation, theory of power series and properties of analytic functions; Cauchy's integral theorem; Riemann surfaces; contour integration and residues; La Place and Fourier transforms. *Prerequisite:* Calculus.

STATISTICS

3-126. Introductory Statistics

Year, 2 credits each semester. Repeated in Spring and Summer

HOWARD EDELSON

C. M. PURVES

OTTO RAUCHSCHWALBE

The collection of data. The presentation of data in tables and charts. Different kinds of averages. Dispersion. Introduction to index numbers. Relations between two or more variables. Introduction to correlation theory, regression, and interpretation of samples. Practice in calculations. *Prerequisite:* High school algebra and geometry.

3-135. Elements of Statistical Drafting

Fall, 2 credits. Repeated in Spring

NELSON P. GUIDRY

A practical course in drafting involving actual preparation of statistical maps and charts in class. Explanations of short cut methods of lettering technique and arrangement of component parts of illustrations. Complete illustrations will be prepared in ink ready for publication. The reduction, reproduction, and color application to statistical maps and charts will be explained. Students supply their own drafting tools.

3-136. Graphic Methods of Presenting Statistics

Fall, 2 credits. Repeated in Spring

R. G. HAINSWORTH

Analysis of statistical data to determine what form is best for graphic presentation. Application of data to the many types of illustrations in several forms of the various classes. Rough pencil layout examples of time series charts, frequency diagrams, graphic correlation charts, pictorial symbol charts, cartograms and other illustrative examples will be prepared in class. Comparability and evaluation of individual charts and maps in a series will be analyzed. *Prerequisite:* An introductory course in statistics, Elements of Statistical Drafting, or experience approved by the instructor.

3-318. Elementary Machine Tabulation

Fall, 2 credits. Repeated in Spring

MILTON KAUFMAN

Designed principally for statisticians, accountants, and operators of punch card tabulating equipment. The instruction covers the principles of operation, functions, applications, limitations, etc. of the various types of IBM equipment such as card punching and verifying machines (including types 24 and 26), sorters, alphabetic accounting machine (type 405), reproducing punches and other auxiliary machines. *The course covers instruction in the basic wiring of the machines.* More than half the course is spent on the alphabetic accounting machine (type 405). Instruction also deals with the principal Remington Rand punch card tabulating equipment. The course is not intended to train personnel in the physical operation of the various machines.

3-319. Advanced Machine Tabulation

Fall, 2 credits. Repeated in Spring

MILTON KAUFMAN

Designed principally for statisticians, accountants, operators and supervisors of punch card tabulating equipment. The instruction covers the principles of operation and functions of the IBM accounting machines, types 402 and 407 and the collating machines, types 77 and 89. *The course covers instruction in the wiring of the machines including the solution of advanced wiring problems.* *Prerequisite:* Elementary Machine Tabulation or knowledge of the basic wiring of tabulating equipment.

3-380. Principles of Statistical Analysis

Year, 3 credits each semester

B. RALPH STAUBER

The purpose of the course is to lay a thorough foundation of the basic concepts and principles of statistical analysis as a method of scientific investigation.

Specifically, the course includes statistical terminology; elementary probability; the binomial, Poisson, and normal distributions; statistical tests of significance; simple and multiple correlation; some theory of determinants with applications to correlation and the inverse matrix; introduction to analysis of variance; introduction to sampling; elementary principles of design and analysis of surveys and experiments; use of statistical tables such as Fisher, Yates, and others. *Prerequisite:* A working knowledge of college algebra, plane trigonometry, and analytic geometry; an elementary course in statistics is desirable.

3-400. Introduction to Mathematical Statistics

Year, 3 credits each semester

JOSEPH F. DALY

A foundation course. A broad introduction to modern mathematical statistics, as preparation for further work in mathematical statistics for an advanced degree, or for a certified statement of accomplishment. Estimation: bias, consistency, efficiency. Testing statistical hypotheses. Solution of problems. Powers of various statistical tests. Use of moment generating functions to solve distribution problems. Methods of solution when the underlying distribution is unknown. Design of experiments and of sample surveys. *Prerequisite:* Calculus and Principles of Statistical Analysis or equivalent.

3-405. Introduction to Experimental Statistics

Year, 2 credits each semester

WALTER A. HENDRICKS

A non-mathematical course in the analysis and interpretation of data from agricultural and biological experiments. Elementary probability relationships; binomial, Poisson, and normal frequency distributions; the concept of sampling error; tests of significance of differences between averages; the chi-square test as applied to differences between observed and expected frequencies; regression and correlation; and elementary discussions of analysis of variance and covariance. Numerical examples. Text: Snedecor, Statistical Methods. *Prerequisite:* College training in agriculture or a biological science; familiarity with ordinary methods of tabulating experimental data, computation of averages and the preparation of graphs.

3-412. Statistical Methods in Engineering

Year, 2 credits each semester

W. R. PABST

First half: Use of statistical methods in analyzing engineering problems, development of sampling plans and tables, acceptance sampling, use of quality control charts.

Second half: Sampling methods for engineering purposes, design of engineering experiments, intensified and sensitivity testing, interpretation of test data, application to specifications. *Prerequisite:* Elementary statistics and a degree in science or engineering, or permission of the instructor.

3-435. Sampling in Social and Economic Surveys

Year, 3 credits each semester

HAROLD NISSELSON

Non-mathematical survey of sampling theory and practice. Development of the basic ideas of statistical sampling, with applications in social and economic surveys. Unrestricted random, stratified, systematic, area and cluster sampling, and subsampling. Sample designs used in the United States and in foreign countries are discussed with respect to considerations of statistical efficiency, cost functions, and the administrative limitations imposed on the design. *Prerequisite:* A course in elementary statistics.

3-436. Questionnaire Construction and Interviewing

Fall, 2 credits

HYMAN GOLDSTEIN

Techniques for data collection in sample and census surveys; defining the issues; constructing the dummy tables; the pretest; question types; probes; scaling methods; projective techniques; depth interviewing; the focussed interview; interviewing practices; training interviewers; refusals; interviewer competence. *Prerequisite:* Principles of statistical analysis, or equivalent, and a background in the social sciences.

3-437. Market and Opinion Research Methods

Spring, 2 credits

HYMAN GOLDSTEIN

Psychology of the consumer; factors influencing consumer behavior and consumer preference; techniques of consumer, dealer, and opinion research; product, container, and trade-mark research; structure of the problem; setting up the survey design; defining the universe; uses of secondary factual data; advertising media and the factors influencing advertising effectiveness; measurement of advertising effectiveness; types of commercial and government research agencies; impact of market and opinion research on our economy. *Prerequisite:* Principles of statistical analysis or equivalent, and a background in the social sciences.

3-480. Statistical Methods and Experimental Design

Fall, 12 credits. Repeated in Spring AUSTIN A. HASEL and JAMES G. OSBORNE

Application of statistical methods to research work in the Forest Service stressing the logic of experimentation and the techniques of design, analysis, and interpretation of experiments or surveys. Emphasis is placed on: testing hypotheses in forest research; distribution of sample statistics; tests of significance.

Registration limited to qualified research personnel of the Forest Service.

[3-515.] Statistical Reports (1955-56 and alternate years)

Fall, 2 credits

MORRIS B. ULLMAN and WILLIAM LERNER

3-520. Government Statistics

Fall, 2 credits (alternate years)

MORRIS B. ULLMAN

Designed to give acquaintance with the wealth of data available from Federal agencies; methods used by different agencies for the collection of data; comparisons of biases, definitions, and basic concepts; different methods of presentation. The first semester concentrates on limitations inherent in data, the second on sources and uses of data. *Prerequisite:* A course in elementary statistics.

3-532. Introduction to Linear Programing

Fall, 3 credits

GEORGE G. O'BRIEN

The transportation problem, linear inequalities subject to the optimization of a linear functional, degeneracy, linear inequalities, duality and the equivalence of linear programing to game theory. *Prerequisite:* Calculus.

3-533. Introduction to Operations Research

Spring, 3 credits

GEORGE G. O'BRIEN

The basic mathematics useful in operations research, including probability and statistics, the optimum distribution of effort, queuing theory, game theory, the variational method and information theory. Individual operations research projects are assigned.

3-535. Statistical Techniques in Biometry and Medicine

Fall, 2 credits (alternate years)

JACOB LIEBERMAN and ASSOCIATES

A general review of necessary statistical tools, especially analysis of variance. Statistics of diagnostic tests; statistics of blood counts; multiple testing; theory of bio-assay; clinical trials. *Prerequisite:* A course in elementary statistics and a degree in one of the sciences, or consent of the instructor.

3-560. Theory of Electronic Digital Computing Machines

Year, 2 credits each semester

EDWARD W. CANNON

Mathematical requirements for electronic digital computers. Alternative methods of sequencing automatic computers—instruction codes. Electronic computer systems and components—internal memory, control, arithmetic unit, input-

output devices. Performance characteristics of electronic computers; analysis of errors. Preparation of problems for machine solution. *Prerequisite:* Advanced calculus or differential equations.

3-571. Design, Philosophy, and Interpretation of Experiments

Year, 2 credits each semester

GLENN L. BURROWS

Basic philosophy of the experimental method. Characteristics of a good experiment. Experimental designs and the associated statistical techniques for analyzing data. Methods for improving the precision of experiments. The main emphasis is upon the assumptions and procedural requirements that permit sound statistical inference rather than upon mechanics of the analysis. A critical appraisal of the appropriateness of widely used design and analysis techniques, and treatment of some recently developed or not widely known techniques designed to handle special problems. Problems submitted by students are used wherever appropriate.

3-710. Multivariate Analysis

Year, 2 credits each semester

JOSEPH F. DALY

Some properties of the multivariate normal distribution; joint moments of sample variances and covariances. Tests of significance; problems of estimation. Joint distribution of variance and covariance; distribution of the correlation coefficient when the population correlation is and is not zero. Least squares; relation to maximum likelihood and to the analysis of variance. Distribution of the multiple correlation coefficient. Discriminant functions. Orthogonal polynomials. Non-normal distributions. Applications. *Prerequisite:* A course in mathematical statistics; calculus; and linear algebra or higher algebra.

3-735. Theory of Sample Surveys

Year, 2 credits each semester

JOSEPH STEINBERG

History of sampling in social surveys. The use of statistical control in improving the quality and efficiency of the estimates. Calculation of sampling errors. Random, stratified random, purposive, double and systematic sampling. Cost function, choice of sampling unit; size and type of sample necessary to attain a stated degree of precision, and the distinction between precision and accuracy. The theory of probability is developed as necessary. The contributions of Fisher, Neyman, Yates, Cochran, and others are studied. *Prerequisite:* Principles of Statistical Analysis and Calculus.

[3-748.] Introduction to Mathematical Analysis (1955-56 and every third year)

Fall, 3 credits

Instructor to be announced

[3-751.] Theory of Measure (1955-56 and every third year)

Spring, 3 credits

Instructor to be announced

[3-752.] Advanced Theory of Probability (1956-57 and every third year)

Year, 3 credits each semester

JULIUS LIEBLEIN

3-025. The Organization of Statistical Services within the Federal Government—Seminar

Fall, non-credit

WALTER F. RYAN

The Federal statistical system: its growth, organization, major characteristics, and functions. A series of four lecture-seminars meeting at 3:30 to 5:00 P.M. on October 6, October 20, November 3, and November 17. No registration is required; no fees are charged.

Office Techniques and Operations

DEPARTMENTAL COMMITTEE

HENRY A. DONOVAN (Chairman)

VIRGIL L. COUCH

ROBERT H. FUCHS

WILLIAM S. HARRIS

MARK M. KIRKHAM

JOHN S. LUCAS

A. R. MILLER

WILLIAM L. MOORE (Vice-chairman)

EDMUND STEPHENS

The courses offered in this department are practical, how-to-do-it courses of interest chiefly to persons in grade GS-7 positions, or below, who are working with these procedures, or who hope to train themselves for such positions. They are helpful also to persons in positions requiring some familiarity with more than one of the procedures (e.g., supervisors and administrative assistants), and to persons at the higher levels of responsibility who wish to become acquainted with the details of the operations.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN ADMINISTRATIVE PROCEDURES

The program leading to a Certified Statement of Accomplishment in Administrative Procedures should be of special interest to:

1. Persons already employed in administrative work of the procedural type, emphasizing techniques and skills.
2. Employees who aspire to enter administrative work but who, because of lack of college education, find their opportunities in that field greatly limited.
3. Employees who wish to prepare to become administrative assistants or to head units concerned with administrative procedures.

Requirements

1. High school diploma or equivalent.
2. Sixteen semester hours of credit with grades of "C" or better in Graduate School courses, distributed as follows:
 - a. A course in American National Government.
 - b. A minimum of eight credits (in addition to *a* above) selected from courses above the 100 level in the Department of Office Techniques and Operations or the Department of Public Administration, or a combination of these. Courses in accounting may not be included, except Federal Accounting Procedure and Federal Government Accounting.

- c. The remaining credits may be selected from courses, not included above, in the Department of Office Techniques and Operations, excluding all shorthand courses.
- d. A course in elementary statistics may be included. It is not required. If it is included, three credits may be deducted from c above.

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CLERICAL-ADMINISTRATIVE PROCEDURES

4-101. Everyday Mathematics

Fall, 2 credits. Repeated in Spring and Summer

RALPH R. BOTTS
C. M. MOUSER

Designed for clerical workers who are called upon to apply fundamentals of arithmetic to their jobs. Emphasis will be placed on review of business arithmetic including fractions, ratios, proportion, percentages, common divisors and multiples, progressions and elementary graphs and statistics. Special applications will be made to business problems such as simple interest; simple, bank, cash and trade discount; profit and loss; sales turnover; equation of partial payments and accounts; commuting debts; compound interest; compound discount; and annuities. Use of calculating machine will be explained.

4-108. Administrative Procedure

Fall, 2 credits. Repeated in Spring and Summer

THOMAS J. HICKEY

Intended for persons who wish to become supervisors or administrative assistants or who are now serving in such capacity in a small organizational unit. Deals with the aspects of the day to day assignments for which these persons ordinarily are responsible, such as preparation of budget data for small organizational units; the proper establishment of authority and responsibility and organization structure; fundamentals of personnel administration; essential requirements for good supervision.

The second part of this course deals with the introduction to administrative planning, administrative procedures and management generally at the lowest organization level, including work reporting and work measurements, work processes and work control reports; relation of these studies to the budgetary and personnel needs of the unit; and the theory of staff versus operating jurisdiction over administrative planning.

4-208. Advanced Administrative Procedure

Fall, 2 credits. Repeated in Spring

M. GEORGE GOODRICK

Intended for persons who are now assigned to administrative assistant and supervisory positions. Deals with (1) the conduct of administrative and procedural surveys and audits directed toward the development of factual data for management purposes; the analysis of these data, the preparation of reports and recommendations thereon; (2) the putting into effect of the approved recommendations through the actual drafting of procedural instructions and the designing and standardization of forms; (3) the installation of approved procedures and the establishment of executive controls to insure compliance with approved instructions; (4) the modern and tested techniques and methods ordinarily used in developing factual data and graphic presentations regarding flow of work, organization structure, work assignments, authority, work duplications, delays and bottlenecks; (5) report writing; (6) the value of illustrated presentations of work processes in eliminating duplication of work, in simplifying operations and in cutting out unnecessary steps; (7) the value of and the need for specific written manuals of instructions as tools of management; and (8) the relation of these

instructions to those taught in the other Office Techniques and Operations Courses. *Prerequisite:* Completion of one of the following courses: 4-108, Administrative Procedure; or 6-344, Introduction to Public Administration.

4-110. Federal Auditing Procedure

Fall, 2 credits

HAROLD J. SELINSKY

This intensive one-semester course is intended for those having no previous knowledge of the subject and is designed to furnish fundamental training for employees now in lower grades as clerks, typists, machine operators, etc., who intend to take the course on Advanced Federal Auditing Procedure or who have opportunities of eventually becoming auditors by serving apprenticeships. It covers explanations of, discussions on and practice work with the two most common types of Government vouchers; deals with, to a limited extent, certain related documents and procedures and should prepare students for higher grades and better-paying positions.

4-210. Advanced Federal Auditing Procedure

Spring, 2 credits

EMMETT B. COLLINS

Includes explanations of and discussion on Federal auditing policy and practice along advanced lines. Covers the relationship of auditing to general fiscal control; administrative examination of fiscal documents; application of legislation and regulations; use of Comptroller General Decisions; relation of Comptroller General's Decisions to particular cases; normal methods of handling suspensions, disallowances, certifications, etc.; unusual problems in the audit of standard form 1034 vouchers and 1012 vouchers; relationship of procurement to auditing and the policies followed in the use of purchase orders; authority for travel and policies relating thereto; per diem allowances and computations, and policies respecting rates; transportation of property and personnel, use of transportation requests and bills of lading; audit of transportation vouchers; audit of payrolls and application of payroll procedures; General Accounting Office exceptions and preparation of replies; claims, adjustments and direct settlements. This advanced course in Federal Auditing Procedure is designed to assist auditors to prepare themselves for more responsible and more remunerative positions. *Prerequisite:* Federal Auditing Procedure or equivalent experience.

4-112. Federal Accounting Procedure

Fall, 3 credits. Repeated in Spring and Summer

RONALD E. HERREN

Designed particularly to train accounting clerks through instruction of employees now working in lower grades and to assist accounting clerks in present and prospective positions. It embraces explanation of, discussion on, and practice work with the basic ledgers (allotment ledger, objective classification ledger, and general ledger) maintained in connection with funds made available to Federal agencies. Appropriation, apportionment, allotment, disbursement, collection, and reporting processes will be discussed and the relationship between administrative accounts and accounts kept by the Treasury Department and the General Accounting Office explained.

4-113. Federal Property Procedure

Fall, 2 credits

RALPH G. MCINTYRE

An intensive one-semester course covering laws, regulations, and principles dealing with control, utilization, and disposal of Federal personal property. Designed to furnish persons currently employed in this field an opportunity to study approved accountability and control systems, including management techniques, capitalization policies, general ledger controls, audit and inspection requirements, inventory controls, and accountability methods; utilization policies and procedures, including development and application of use, replacement, and preventive maintenance standards; management through inventory controls, surveys,

and inspections; disposal policies and procedures, including transfers, donations, sales, abandonment, and destruction; statistical reporting of motor vehicles.

4-114. Federal Personnel Procedure

Fall, 2 credits. Repeated in Spring and Summer

VERNA C. MOHAGEN

Deals with the elementary principles and procedures of Federal personnel administration, including a study of the Federal personnel structure and organization, history and progress of the merit system, rules and regulations of the Civil Service Commission, and other basic procedural sources; use of personnel forms and records; Civil Service examinations and recruitment; appointments; transfers; promotions; separations and reductions in force; suspensions and disciplinary actions; retirement; performance ratings; leave and hours of duty; personnel reports, applications of Decisions of the Comptroller General, administrative policy statements, and administrative orders.

4-214. Advanced Federal Personnel Procedure

Fall, 2 credits. Repeated in Spring

EUGENE J. PETERSON

Similar to Federal Personnel Procedure but more intensive in its treatment of certain phases of the subject. Deals with advanced principles and techniques in Federal personnel procedures and their relation to operating programs, including a study of the principles of the Civil Service Act, Rules and Regulations, and their application to day-to-day problems in a Federal personnel office; recruiting sources for Civil Service examinations and appointments; study of promotion-from-within procedures; reduction-in-force procedures, and their application to specific operating situations; study of procedures for systematic retirement of employees reaching annuity age; procedures for investigation and enforcement of discipline; periodic reports and their use for operating purposes; procedure and policy statements in the general field of personnel administration; procedural source materials such as the Civil Service Commission, Federal Personnel Manual, Decisions of the Comptroller General, Executive Orders, etc., and applying them to detailed operating procedures; relationship of the personnel office to budget, accounting, payroll, and other staff functions. *Prerequisite:* Federal Personnel Procedure or equivalent practical experience in a Federal personnel office at Grade GS-4 or above.

4-115. Federal Purchasing Procedure

Year, 2 credits each semester

TONY M. BALDAUF

This course is designed to assist employees, who are engaged in purchasing work or wish to get into it, in learning the detailed requirements of laws, regulations, and procedures applicable to procurement from Federal sources of supply and purchasing or contracting for supplies and services in the open market; the practical application of such requirements through the preparation of procurement and related documents covering the more common types of transactions; and solution of problems pertaining thereto. The fall semester is devoted to those phases having general application to purchasing and contracting but more specifically to procurement from Federal sources of supply and purchasing not requiring the solicitation and acceptance of bids.

The spring semester is devoted to acquiring knowledge of basic laws, regulations, and procedures needed in making the simpler contracts arising from competitive bidding or negotiation, with special attention given to the latter as authorized by the Federal Property and Administrative Services Act of 1949.

4-116. Federal Budgetary Procedure

Fall, 2 credits. Repeated in Spring

JESSE B. MCWHORTER

This course is designed to assist employees either in budget work or preparatory to taking budget work, up to and including Grade GS-9. It deals with budgetary procedures, including the preparation of estimates, justifications,

tabular statements, graphs, etc., and, in connection with budget execution, outlines methods in making allotments, preparation of apportionment and obligation reports, and other methods used in the formulation and execution of the Federal budget.

4-201. Supervision

Fall, 2 credits. Repeated in Spring and Summer

EARL D. SHARAR

A course for persons who have or expect to have first-line supervisory responsibilities. Particular emphasis will be placed upon the need for understanding human behavior and attitudes as they manifest themselves in group efforts. The dynamic setting in which supervisory responsibilities are discharged, its importance to management, the individual qualities and specific techniques employed by supervisors to improve work methods will be considered, and a program of self-development and self-evaluation in the art of supervision suggested.

RECORDS MANAGEMENT

4-117. Records Management Procedure

Fall, 2 credits

DOROTHY M. LUTTRELL and ROBERT H. LANDO

A course of instruction in how to process, maintain and service records, designed for students who desire to enter the records management field or who are interested in supplementing their knowledge of the mechanics and techniques of record operations. Includes detailed instructions in methods of (1) recording and controlling communications, (2) classifying, coding and indexing correspondence and other record material, (3) filing records and references, and (4) furnishing records reference service, including the establishment and operation of charge-out and follow-up systems. This course also provides study and discussion of (1) the theory and structure of the various systems of classification and filing, (2) the selection of the proper systems of classification for individual requirements, and (3) the development of individual classification and filing patterns.

4-217. Advanced Records Management

Spring, 2 credits

DOROTHY M. LUTTRELL and ROBERT H. LANDO

Designed to give the student a comprehensive knowledge of the management of Government records. Includes a detailed study of the requirements of the Federal Records Law and action necessary for meeting the requirements of this law; the application of management techniques to the creation, maintenance, utilization, preservation and disposition of records. Also includes a discussion of laws and regulations governing the preservation and disposal of records, appraisal, systematic retirement, storage, disposal and microphotography; the development and application of records retention and disposal standards. *Prerequisite:* Records Management Procedure or consent of instructor.

4-420. Procedure or Directive Systems

Fall, 2 credits

SAMUEL E. LANDIS

A study of the various systems for issuing directive-type material covering policies, procedures, and other official information. Special attention is given to the basic elements of a flexible directives system, and methods of originating directives, defining distribution, and improving reproduction processes. Technical functions such as codifying and indexing, and the development of standards for format and editing are included. The course provides a technical background for developing and evaluating various directives systems and to provide techniques for installing and operating effective systems.

4-422. Reports and Forms Management

Fall, 2 credits. Repeated in Spring EDWARD J. LEWIS and WILLIAM B. RICE

Designed to provide students with a comprehensive knowledge of forms and reports management systems and how to operate them. A study of: various systems used for controlling forms and reports; different techniques used in Government for forms design and format; standards and printing specifications; methods for analyzing forms and reports; and how to install and operate forms and reports management programs. Analysis of forms and reports by case studies with group discussion of techniques involved. Special lectures by top technicians from representative Government departments.

4-424. Correspondence Management

Fall, 2 credits

MONA SHEPPARD

A course designed to acquaint the student with ways and means of producing the highest quality of correspondence with the minimum expenditure of time and effort. Includes (1) the organization of a correspondence management program, (2) means of coordinating correspondence management activities, (3) techniques such as guide letters and form letters, (4) shortcuts such as the use of facsimiles and specialty envelopes, (5) "seven keys" to more efficient typing methods, and (6) improvement in letter writing.

GOVERNMENT LETTER AND PROCEDURE WRITING

4-330. Government Letter Writing

Fall, 2 credits. Repeated in Spring and Summer

VERNE L. SAMSON

Intended for persons in administrative positions who are called upon to handle administrative problems through correspondence. The writing of clear, accurate, concise, courteous letters and memoranda. Principles of effective letter writing. Practice in criticizing and revising outgoing correspondence, and in planning and drafting replies to incoming letters. *Prerequisite:* A good foundation in English grammar, vocabulary, and composition, through courses or writing experience.

4-421. Writing Procedures and Instructions

Spring, 2 credits

KAY PEARSON and ERNEST T. SPIEKERMAN

A course of instruction in how to develop and write manual issuances, circulars, office memoranda, and other forms of rules, regulations, instructions, and procedures. Special attention will be given to ways of improving readability of such material, the use of a clear, simple style of writing, proper format, and use of "ready-reference" aids. It will provide drill in the practical application of principles and theories of procedure to actual writing. The purpose of the course is to provide students with group experience in writing procedures and instructions and in applying editorial and format standards. *Prerequisite:* Procedure or Directive Systems, or one year of experience in writing procedures at Grade GS-5 or above.

SECRETARIAL PRACTICES

The course in Secretarial Practices is designed to help stenographers develop the knowledge and skills required of a good secretary. Those who are already in secretarial positions will find it helpful to them in improving their performance.

Special emphasis is placed in the course on material of interest to secretaries who are planning to take the CPS (Certified Profes-

sional Secretary) examination, sponsored by the National Secretaries Association. Other courses which would be helpful to these students are: Introduction to the Study of Human Relations, Everyday Mathematics, Introduction to Economics, Business Law, and Supervision.

4-325. Effective Secretarial Practices

Fall, 3 credits

ELLEN S. GROFF

A course of study presenting an analysis of the secretarial profession, stressing the general duties required of a secretary, the development of a secretarial personality and occupational intelligence, with practical and realistic discussion of secretarial procedures. Special emphasis placed on modern alphabetical filing system and dictation of business letters. For secretaries and stenographers in government and private industry.

SHORTHAND

These courses are designed to furnish Federal employees an opportunity to follow a program of training for stenographic careers in the Federal service. While each course represents a separate unit of study, with emphasis on material used in the Federal service, a proper sequence of courses insures a sound foundation for successfully qualifying for the various grades and classifications of stenographers in the Federal service.

"Review of Gregg (Anniversary)" will serve as rapid review for the student who has not applied his shorthand knowledge for a long time, or has used it so little that he feels uncertain about applying his knowledge to practical office dictation. Students wishing a review of Gregg Simplified should enroll in "Gregg, 60 to 80 Words."

"Gregg, 100 to 130 Words" is an intensive course on technical material. Students should have a sound foundation in theory and be able to write 100 words a minute with a 95 percent accurate transcript before registering for the course.

The three courses in Reporting Shorthand are open to stenotypists as well as Gregg writers.

Home study is required in all the courses to attain goals set in course descriptions. Amount of study required varies according to the learning habits and individual goals of students.

A prerequisite for all shorthand courses is the ability to type-write with a fair degree of accuracy and speed.

4-89. Review of Gregg Shorthand (Anniversary)

Fall, non-credit. Repeated in Spring and Summer

HARRIET E. STERN

A review of theory and brief forms. Reading from shorthand plates and students' own notes; dictation of standard material at various progressive rates of speed. *Prerequisite:* Completion of the Gregg Manual or its equivalent by the Anniversary system.

4-129. Gregg Shorthand Simplified I

Fall, 3 credits. Repeated in Spring and Summer

MARY A. KELLY

KATHRINE WILKEY GAASTERLAND

Completion of the theory of Gregg Shorthand Simplified. Beginning dictation on new and practiced material.

4-130. Gregg Shorthand Simplified II

Fall, 3 credits. Repeated in Spring and Summer

MARGARET O. HOBBS

MARY A. KELLY

KATHRINE WILKEY GAASTERLAND

Increasing mastery of principles of Gregg Shorthand Simplified, by review and drill. Minimum dictation speed of 60 words a minute attained, with accurate transcripts, on new standard material. *Prerequisite:* Gregg Shorthand I or equivalent.

4-225. Gregg Shorthand Simplified, 60-80 Words

Fall, 3 credits. Repeated in Spring and Summer

E. DONALD BELL

Theory review. Minimum dictation speed of 80 words a minute attained. *Prerequisite:* Shorthand I and II or equivalent theory and dictation courses, and a minimum speed of 60 words a minute on new, standard material.

4-226. Gregg Shorthand, 80-100 Words

Fall, 3 credits. Repeated in Spring and Summer

EDRIE C. WAY

For those who have a minimum dictation speed of 80 words a minute using either the Simplified or Anniversary system, and who are able to produce accurate transcripts of letters and reports. Students who are weak on theory should take either 4-89 or 4-225 before enrolling in this course.

4-231. Gregg Shorthand, 100-130 Words

Fall, 3 credits. Repeated in Spring

EDITH WELTNER

For students who have a minimum dictation speed of 100 words a minute and who are able to produce accurate transcripts and reports. Review of theory. Speed-building.

4-335. Introduction to Reporting—Gregg, 130-150 Words

Fall, 4 credits. Repeated in Spring

FRANCES A. BUTLER

For those who have qualified on 130-word a minute standard tests or their equivalent. Students should have strong theory background before enrolling in the reporting classes. Introduction to reporting techniques for conferences, hearings, etc. Open to stenotypists who wish the practice of regular dictation.

4-336. Reporting—Gregg, 150-175 Words

Fall, 4 credits. Repeated in Spring

JACK ROMAGNA

Continuation of 4-335. High-speed short-cuts and advanced reporting methods, preparatory to taking verbatim reports of lectures, hearings, and conferences. Open to stenotypists who wish the practice of regular dictation.

4-337. Reporting—Gregg, 175-200 Words

Fall, 4 credits. Repeated in Spring

ALMA FRANKLIN

Continuation of 4-336.

Physical Sciences

DEPARTMENTAL COMMITTEE

HENRY STEVENS (Chairman)

S. W. BOGGS

L. W. CURRIER

ELSA O. KEILES

ARNOLD J. LEHMAN (Vice-chairman)

HARRY WEXLER

JOSEPH B. LEVY

JOHN LYMAN

LOUIS C. PELTIER

MAURICE J. TERMAN

—O—

The courses in this department offer unusual opportunities for study under the guidance of scientists working in this field. The program will be of value to students who plan to enter these sciences; to those who desire to increase their knowledge of the science in which they now earn their living; and to those who wish, for cultural reasons, to learn more about these fields.

Most of the courses in this department are seminars designed to keep professional workers informed of recent developments in their fields and do not include laboratory work. A few of the courses offer basic training and, as indicated in the course descriptions, include laboratory work.

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ASTRONOMY

5-175. Descriptive Astronomy

Fall, 2 credits

IRVING GREENBAUM

Designed, primarily, to give the layman and amateur astronomer a better understanding of the heavens about us. It deals in a non-technical manner with a description of our solar system, including the planets, their satellites, and meteors; stars in our galaxy; and systems beyond our galaxy. The nature of some of the fundamental laws and forces at work in our universe are considered. Tours and field work acquaint the student with some of the equipment and methods employed by astronomers, and graphically represent various aspects of the skies.

8-217. Astronomy for Engineers

(See p. 97)

CHEMISTRY

5-65. Review of Elementary Organic Chemistry

Summer, non-credit

C. S. PRICKETT

General survey and review of material usually covered in first course in organic chemistry. Emphasis is on reaction chemistry and practice with synthetic methods based on important reactions. *Prerequisite:* Course in organic chemistry.

5-315. Elementary Biochemistry

Year, 2 credits each semester (alternate years)

SIDNEY M. HESS

The first semester's material will cover pH, oxidation-reduction, the chemistry of carbohydrates, fats, proteins, and the fundamentals of enzyme chemistry. The second semester will deal with the digestion and absorption of food, intermediary metabolism, excretion, vitamins, and hormones. Lectures, discussion, and examinations. *Prerequisite:* Organic chemistry.

[5-349.] Physical Chemistry (1955-56 and alternate years)

Year, 2 credits each semester

WILLIAM HORWITZ

[5-400.] Advanced Organic Chemistry (1955-56 and alternate years)

Year, 2 credits each semester

WILBUR I. PATTERSON

5-412. Agricultural Science Instrumentation

Fall, 3 credits

C. F. WINCHESTER and SPECIALISTS

Detailed discussion and laboratory demonstrations of some of the instruments and techniques used in agricultural analyses for determination and identification of elements and compounds. The methods, selected on the basis of the interests of the students enrolled, may include: spectrophotometry, paper chromatography, radioactivity techniques, ultramicroscopic techniques, countercurrent distribution, microbiological assays, pH determinations, and other techniques. Given at the Agricultural Research Center, Beltsville, Maryland.

[5-515.] Physical Biochemistry (1956-57 and alternate years)

Year, 2 credits each semester

WILLIAM HORWITZ

[5-522.] Advanced Biochemistry (1955-56 and alternate years)

Year, 2 credits each semester

SIDNEY M. HESS

5-540. Introduction to Chemical Kinetics

Fall, 2 credits (alternate years)

JOSEPH B. LEVY

A simple and balanced account of the general principles of chemical kinetics and its experimental application. The fundamental theories of reaction rates examined in a non-mathematical fashion. The characteristics of gas phase reactions and reaction in solution from the point of view of kinetics with greater emphasis on the gas phase. *Prerequisite:* Undergraduate course in physical chemistry.

5-541. Theoretical Organic Chemistry

Spring, 2 credits

JOSEPH B. LEVY

The theoretical aspects of organic reactions. Includes the theory of resonance, aromatic substitution, and in general the principles which govern and explain the way organic reactions occur. *Prerequisite:* Undergraduate course in organic chemistry.

[5-542.] Physical Organic Chemistry (1955-56 and alternate years)

Fall, 2 credits

JOSEPH B. LEVY

5-545. Alkaloids, Glucosides, and Toxins of Biological Importance

Spring, 2 credits (alternate years)

GEOFFREY WOODARD and SPECIALISTS

Subject matter covers items such as morphine, nicotine, ergot and quinine (cinchonidine) alkaloids; cardiac glycosides; snake venom, mushroom, honey and shellfish toxins; and toxins of bacterial origin. Emphasizes the relation of chemical structure to biological activity and methods of analysis, either chemical or biological. *Prerequisite:* Degree in biology or chemistry, or equivalent; knowledge of organic chemistry desirable.

[5-550.] Pharmacology of Insecticides (1955-56 and alternate years)

Spring, 2 credits

BERNARD DAVIDOW

5-620. Advanced Inorganic Chemistry

Year, 2 credits each semester

C. S. PRICKETT

The chemistry of the less familiar elements as well as such special subjects as complex formation, stereoisomerism of inorganic substances, etc., interpretation of chemical properties in terms of atomic structure. *Prerequisite:* Qualitative analysis, and physical chemistry or college physics.

5-625. Specialized Analytical Techniques

Fall, 2 credits

GEOFFREY WOODARD and STAFF

A detailed discussion of some of the physical methods used in analytical work for determination, separation, or identification, particularly of organic compounds. Among the methods covered are ultraviolet, visible, and infrared spectrophotometry, partition, adsorption, and paper chromatography, and counter current distribution. Emphasis is placed on practical applications. Laboratory demonstrations are included where possible.

5-630. Enzymatic Basis of the Pharmacological Action of Drugs

Fall, 2 credits (alternate years)

Instructor to be announced

Enzymatic studies in relation to the effects of cardiac drugs; parasympathomimetic and parasympatholytic drugs involving cholinesterase; natural and synthetic drugs producing antithyroid effects; vesicants; metabolic stimulants; and metabolite inhibitors. *Prerequisite:* Undergraduate degree in biology or chemistry, or equivalent.

5-714. Chemistry of Nutrition

Year, 3 credits each semester

C. F. WINCHESTER

A seminar. Topics discussed are determined by the interests of the students and may include nutrition of animals and humans; metabolism of carbohydrates, proteins, lipides, minerals, and vitamins; relationships between hormones and nutrition. The first semester is to be offered in Spring, 1955, at the Agricultural Research Center.

GEOGRAPHY AND GEOLOGY

Students who are studying or working in the field of geography or geology may be interested, in addition to the courses listed here, in courses in Soil Sciences, Meteorology, and Surveying and Mapping.

Geography

5-114. Maps and Charts

Fall, 2 credits

CATHERINE I. BAHN

An introductory course designed to give the analyst, researcher, librarian or teacher who works with maps an understanding of both domestic and foreign maps and charts, the agencies which produce them, their catalogs and indexes. Presents methods in reading and problems in interpreting foreign maps. United States, foreign and international mapping activities will be studied on a workshop basis to permit presentation and solution of individual problems. All types of maps, charts, aids and reference materials will be available for laboratory use.

5-420. Geography of the Eastern United States

Fall, 2 credits

VINCENT M. THROOP

Geographic regions of the United States east of the hundredth meridian in relation to the basic principles of geography. The physical setting and organization of activities in each region. Techniques of analysis are introduced and applied as they relate to current problems. Special emphasis is given to urban areas.

5-421. Geography of Western United States

Spring, 2 credits

VINCENT M. THROOP

The geographic regions west of the hundredth meridian, from the viewpoint of the geographic principles involved. Practice in the application of regional analysis is developed through the study of current problems. Land and water utilization receive special emphasis.

5-428. Field Methods

Fall, 2 credits

A. J. WRAIGHT

Methods of gathering data firsthand from the field, for students in geography, geology, biology, agriculture, economics, statistics, sociology, or related subjects. Basic sources to check before field work; kind and use of equipment. All methods are demonstrated, with proper equipment, and students are given actual field practice. Proper recording, note-taking, and report-making procedures are considered, thus carrying the execution of field work from the preparation through the final report stage. *Prerequisite:* One course in any one of the disciplines mentioned above.

5-450. Transportation Geography

Fall, 3 credits

J. SLATEN JENNER

Principles of geography as they apply to the various forms of transportation; analysis of the effects of environmental, economic, industrial, and political factors on routes, methods, and costs of transportation in the United States, both land and water.

5-462. Applied Physical Geography

Fall, 2 credits

LOUIS C. PELTIER

A study of the significance of physical geography and some of its practical applications. Basic principles are reviewed briefly. The aspects of physical geography, particularly land form and climate, which relate to such topics as soil erosion, water supply, human comfort, industrial development, and transportation are considered. *Prerequisite:* One of the following is recommended: a course in geography, physical geology, soil geography, or climatology; or two years of practical work; or 60 hours of college training in any of these fields.

5-562. Plant Geography

Spring, 3 credits

HERBERT C. HANSON

A descriptive and analytical course dealing with the distribution of plants over the earth, changes during the course of geological time, and the causes or explanations of the present distribution. The vegetation and floristic characteristics of the major regions of the earth. Problems of distribution which have arisen and various solutions. Relations between natural plant formations and cultivated regions. Values and applications of plant geographical data and concepts in relation to agriculture, commerce, and other aspects of human economy. *Prerequisite:* College botany or the consent of the instructor.

5-563. Geography of American Agriculture

Spring, 2 credits

CARLETON P. BARNES

A study of the character, trends, and problems of American agriculture in their diverse regional manifestations. Physical background of climate and soil in terms of the regional potentialities they afford and the limitations they set; types of farming and the reason for their distribution; recent regional shifts and their explanation; potentialities for increased production nationally and regionally; regional aspects of soil conservation; regional differences in scale of farm operations and farm family living; regional competition and regional dependency.

*Geology***5-203. General Geology**

Fall, 3 credits

MAURICE J. TERMAN

Minerals and rocks as constituents of the earth's crust; processes of weathering, erosion and deposition; vulcanism; structures of sedimentary and igneous rock formations; diastrophism; mountain building; land forms and their relation to various geologic processes; stability of the earth's crust. The course includes classroom exercises in the study of common minerals and rocks, and interpretation of topographic and geologic maps. *Prerequisite:* Inorganic chemistry is desirable.

5-205. Practical Geology

Spring, 3 credits

MAURICE J. TERMAN

A non-professional course describing the practical uses and economic aspects of geology. General background of historical and regional geology; brief analysis and comparison of exploratory methods; summaries of origins, occurrences, and distribution of ground water, petroleum, non-metallic and metallic mineral deposits; and a survey of the applications of geology to civil engineering. Assignments are made to familiarize the student with the utilization of geologic methods in each of these fields. *Prerequisite:* A knowledge of elementary physical geology or some familiarity with minerals and rocks is desired.

[5-635.] Principles of Ground Water Geology and Hydrology
(To be offered in 1955-56)

Fall, 3 credits

GARALD G. PARKER

5-707. Metamorphic Petrology and Petrography

Spring, 3 credits

ROBERT B. FORBES

A study of the occurrence, origin, and the mineral composition of metamorphic rocks, with additional attention given to related structures and field relationships in type localities. Survey of metamorphic environs, including regional, local, thermal, static, and dynamic metamorphism. Lectures to be sup-

plemented by hand samples and lantern projections of type-thin sections. *Prerequisite:* B.A. or B.S. in geology with previous course work in structural geology, petrography, and mineralogy.

METALLURGY

5-453. Principles of Process Metallurgy

Fall, 2 credits

HAROLD J. TONER

The winning of metals from ores; geographic distribution; methods of reduction, refining, and purification; time required for construction and operation of metallurgical plants; allied industries; skills required; power consumption; alternative methods; efficiency and quality. Existing and proposed methods for production of iron and steel, copper, lead, zinc, and other metals. *Prerequisite:* College degree recommended; course in elementary chemistry required.

5-528. Principles of Engineering Alloys

Spring, 2 credits

HAROLD J. TONER

The plan of this course is to present to engineers the principles and practices relating to the forming, heat treatment, welding, and application of ferrous and non-ferrous alloys; the metallurgical aspects of service behavior; and the substitution of alloys. *Prerequisite:* Degree in engineering or consent of instructor.

METEOROLOGY

The following courses in meteorology are offered in cooperation with the United States Weather Bureau. The courses may be taken singly, or as a program leading to a certificate of accomplishment. Registration in these courses is not limited to employees of the Weather Bureau.

CERTIFIED STATEMENTS OF ACCOMPLISHMENT IN METEOROLOGY

Two Certified Statements of Accomplishment are offered in meteorology. The required programs, with the suggested chronological order of courses, are outlined below. The First Certified Statement of Accomplishment in Meteorology may be awarded to the student who satisfactorily completes the required courses totaling 19 credits. The Second Certified Statement of Accomplishment in Meteorology may be awarded to the student who completes the courses totalling 36 credits. The courses may be taken at a faster rate than the one suggested in the program, with special permission of the Departmental Committee.

The required courses, Calculus and Physics for Meteorology, are considered to be the absolute minimum in mathematics and physics. A more complete preparation, and the one recommended to the person who wishes to make of meteorology his professional career, will require courses also in differential equations and vector analysis, plus at least a one-year course in college physics, with laboratory. Courses in chemistry and statistics would be valuable, but not essential.

COURSES LEADING TO CERTIFIED STATEMENT OF ACCOMPLISHMENT IN METEOROLOGY

First Statement—Elementary

Required Prerequisite Courses. May not be used to meet the credit hour requirement for the certified statement. Equivalent courses will be accepted by transcript from other institutions.

The number in parenthesis after the course title indicates semester hour credits.

Calculus (8)

Physics for Meteorology (3) or a year course in college physics

Required Meteorology Courses.

First Year

General Meteorology (3)

Synoptic Meteorology (6)

Second Year

Introduction to Dynamic Meteorology (6)

Weather Analysis and Forecasting (4)

Second Statement—Advanced

Courses required for the first statement plus the following:

Third and Fourth Years

General Climatology (3)

Advanced Weather Analysis and Forecasting (6)

Electives (8 credits) selected from the following courses:

Hydrology

Statistical Methods in Climatology

Elements of Fluid Mechanics

Applied Climatology

Physical Meteorology

Elements of Dynamic and Synoptic Climatology

Selected Topics in Meteorology

General Oceanography

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5-162. Principles of Meteorology

Fall, 2 credits

ALBERT V. CARLIN

A non-technical course designed for persons interested in the general aspects of weather and for those concerned with the application of weather to their particular field of study.

The first part of the course includes weather instruments and observations, the properties, processes and general circulation of the atmosphere, storms, and climatic conditions of the United States. The use of daily maps and forecasts is discussed.

The second part is a survey of the effect of weather and climate on man and his activities, including agriculture, aviation, transportation, public utilities, business, industry, health and recreation.

5-212. Physics for Meteorology

Fall, 3 credits

HERBERT NEWSTEIN

Topics in college physics with emphasis on applications to meteorological problems. (Subject matter may be varied to meet needs of class.) *Prerequisite:* Calculus.

5-310. Statistical Methods in Climatology

Fall, 2 credits

H. C. S. THOM

A study of modern climatological methods with emphasis on statistical analysis as applied to meteorological data. Elementary concepts of probability are

discussed with application to discrete and continuous climatological series. The basis for climatological prediction is developed together with fundamental principles of the application of meteorology to technology. The distributions of the simple climatological elements are discussed and applications made to meteorological data. Simple regression and analysis of variance theory are developed for use in applied meteorological problems. Confidence interval theory and tests of significance are emphasized throughout the course. *Prerequisite:* A knowledge of elementary meteorology.

5-326. General Meteorology

Spring, 3 credits

SIGMUND FRITZ

A one-semester course in the fundamentals of the physical aspects of modern meteorology for the professionally interested student. Atmospheric composition and structure and their measurements; solar and terrestrial radiation, radiation laws; gas laws; adiabatic, pseudoadiabatic, and non-adiabatic processes; fronts; thunderstorms; fog; wind. *Prerequisite:* High school algebra and trigonometry.

5-415. Applied Climatology

Fall, 3 credits

WOODROW C. JACOBS

The application of well known climatological methods toward solving specific weather problems of business, industry, air and surface transportation, and agriculture. Emphasis is placed on application of climatological methods in the solution of applied problems. The case method of class presentation is employed throughout the course. *Prerequisite:* A knowledge of the basic principles of meteorology. Course 5-310 and/or a knowledge of elementary statistics is helpful but not required.

5-533. Hydrology

Year, 3 credits each semester

MAX A. KOHLER

A two-semester course in basic and applied hydrology at the professional level. The first semester will be largely descriptive, covering such topics as elementary hydraulics; measurement and interpretation of streamflow, precipitation and other basic data; the hydrologic cycle; physics of soil moisture; the infiltration theory; wave travel and the unit hydrograph. The second semester will cover the development and application of procedures for applying basic hydrology to practical problems of river forecasting and design of water control works including such subjects as streamflow routing, flood frequency, the rational method of estimating flood magnitude, hydrometeorology, forecasting of runoff, influence of water control structures on streamflow, and problems of water control operation. *Prerequisite:* Physics and algebra; elementary meteorology, statistics, and engineering desirable.

5-534. Introduction to Dynamic Meteorology

Year, 3 credits each semester

MORRIS TEPPER

Designed to illustrate the use of higher mathematics and physics in the interpretation of meteorological phenomena, and in the development of forecasting techniques. *Prerequisite:* Calculus, or consent of the instructor.

5-535. Elements of Fluid Mechanics

Year, 2 credits each semester

MORRIS TEPPER

A basic one year course in the foundation of fluid mechanics aimed at giving the student a physical feeling for the more important concepts and relationships involved in problems concerning the flow of fluids. Topics will include: Flow models, basic concepts such as density, pressure, vorticity, viscosity, capillarity, etc., conservation laws, Bernoulli's equation, dimensional reasoning, char-

acteristic parameters such as Froude number, Reynolds number and Mach number, potential flow, surface waves, elements of viscous flow and an introduction to compressible flows. *Prerequisite:* College physics and mathematics through differential and integral calculus.

5-536. Synoptic Meteorology

Year, 3 credits each semester

JAY S. WINSTON

A two-semester course in the fundamentals of modern synoptic meteorology for the professionally interested student. First semester: Air motion in the atmosphere, the general circulation, air masses, fronts, cyclones and anticyclones. Second semester: Distribution of precipitation, fog, etc., geographically and with respect to fronts and pressure centers, features of the upper levels, prognostication of sea-level and upper-air charts, forecasting weather. *Prerequisite:* Physics for Meteorology or college physics, and calculus; or consent of instructor.

5-537. Physical Meteorology

Fall, 3 credits

SIGMUND FRITZ

Advanced radiation studies. Solar radiation; solar constant, scattering and absorption in the clear atmosphere and in clouds, albedo of clouds and of planet earth. Terrestrial radiation; use of atmospheric radiation charts. Cloud physics; condensation, growth of drops, precipitation. *Prerequisite:* Calculus.

5-538. Weather Analysis and Forecasting

Year, 2 credits each semester

THOMAS I. GRAY, JR., and JAY S. WINSTON

A laboratory course in which concepts of air masses, fronts, and mid-tropospheric flow patterns are applied to analysis and prognosis of sea level and upper air weather charts for North American and adjacent areas. Short range forecasts of various weather elements are prepared for local and regional areas of the United States. *Prerequisite:* Synoptic Meteorology or equivalent.

5-539. Elements of Dynamic and Synoptic Climatology

Spring, 2 credits

WOODROW C. JACOBS

The methods of dynamic and synoptic meteorology are utilized to develop a theoretical global climatology. The causes of regional and seasonal variations in climate are emphasized. Climatological data are used only to verify theoretically derived climatic models. *Prerequisite:* Physical Meteorology and Synoptic Meteorology, or consent of the instructor.

5-544. General Climatology

Fall, 3 credits

HARRY F. HAWKINS, JR.

Discussion of the distribution of radiation, temperature, winds, pressure, hydrometeors, and of the factors which influence their distribution at earth's surface and aloft. Description of climatic zones and types. The distribution and variations of air masses, fronts, cyclones, anticyclones and tropical storms. Climatological significance of blocking and of mean troughs and ridges. Regional climatic differences from synoptic implications. Discussion of micro-climatology vs. climatology. *Prerequisite:* Physical Meteorology and Synoptic Meteorology, or equivalent courses.

5-580. Advanced Weather Analysis and Forecasting

Year, 3 credits each semester

THOMAS I. GRAY, JR., and JAY S. WINSTON

Weather data for various regions of the earth are analyzed. More detailed and experimental analysis of data is emphasized including: study and use of isentropic charts, constant vorticity trajectories, vertical motion computation, jet stream analysis, and frontal contour charts. Important forecasting problems,

such as cold waves, heat waves, and severe regional and local storms are investigated. Objective forecast methods for various weather elements are discussed. Methods of extended period forecasting based on motion and development of planetary wave patterns are presented. Lecture and laboratory. *Prerequisite:* Weather Analysis and Forecasting, Synoptic Meteorology, or equivalent.

[5-705.] Selected Topics in Meteorology (Not offered in 1954-55)

Year, 3 credits each semester

JAY S. WINSTON and OTHERS

OCEANOGRAPHY

5-465. General Oceanography

Year, 2 credits each semester

RICHARD C. VETTER and JOHN J. SCHULE, JR.

A two-semester course covering the basic concepts of oceanography. The first semester includes such topics as: history of oceanography, size and shape of the oceans, major ocean currents and water masses, physical and chemical properties of sea water, the biological environment of the sea and submarine geology.

The second semester emphasizes practical applications of oceanographic research covering such topics as wave forecasting, under-water sound, problems in oceanographic instrumentation, and interrelationships of problems in biological, physical, chemical, and geological oceanography. *Prerequisite:* College courses in at least two of the physical or biological sciences. Students who wish to receive graduate credit are required to present a term paper.

SOIL SCIENCES

5-405. Soils—Their Origin and Geography

Spring, 3 credits (alternate years)

CONSTANTIN C. NIKIFOROFF

A descriptive course covering the basic principles of the origin of the soil as a function of the environment and the pattern of distribution of various soils throughout the world. The role of soil formation in broad geochemical and geophysical cycles and the geographical factors of soil formation such as climate, relief, and biological pressure are first discussed in non-technical terms, followed by several lectures dealing with the physical nature of soil and the geographical analysis of the soil pattern of various parts of the world. The dynamic nature of soils and relationships between soils, climate and vegetation are emphasized throughout the course. *Prerequisite:* Freshman chemistry or its equivalent. Previous training in plant ecology, physical geography, and climatology is desirable.

[5-531.] Soils: Their Morphology, Genesis, and Classification

(1955-56 and alternate years)

Spring, 3 credits

CONSTANTIN C. NIKIFOROFF

Public Administration

DEPARTMENTAL COMMITTEE

EARL W. LOVERIDGE (Chairman)

GLADYS L. BAKER

JAMES L. BUCKLEY

K. A. BUTLER

PATTERSON FRENCH (Vice-chairman)

G. E. HILBERT

WILLIAM A. MINOR

ROSS POLLOCK

JOHN H. THURSTON

The importance of public administration in the modern state is apparent. The management problems of government now require personnel with more and better training in public administration. This is true particularly in regard to the junior and assistant positions.

Many of the ablest and most experienced public administrators in the United States are in Washington. Utilizing this unexcelled talent, the Graduate School offers courses to meet the needs of the Federal service in this field.

CERTIFIED STATEMENTS OF ACCOMPLISHMENT IN PUBLIC ADMINISTRATION

COMMITTEE

GLADYS L. BAKER (Chairman)

PATTERSON FRENCH

JOHN H. THURSTON

Certified Statements of Accomplishment are granted to undergraduate and to graduate students who have completed an organized course of study in public administration intended to provide basic training for responsible administrative work.

The programs leading to a Certified Statement of Accomplishment in Public Administration should be of special interest to:

1. Persons already employed in responsible administrative positions. Included in this group are many with specialized training who have been transferred to administrative positions from professional positions without training or previous experience in administration.
2. Junior Management Assistants. Those who entered the service with a management option may profit from courses both more advanced and more specialized than those taken in college. Those who entered on various professional options and are now employed in such professions can profit very greatly from these courses if they expect, or wish to prepare, to enter into administrative work connected with their professional fields.

3. Employees who wish to broaden their understanding and improve their efficiency through a "tour of duty" by study, in lieu of an actual tour of duty for which they have found no opportunity.
4. Employees with college background who aspire to transfer to a career in administrative management.
5. Administrative assistants and administrative technicians of all kinds.

Requirements—Undergraduate Study

Students seeking this statement should consult with the Registrar and obtain approval of their proposed course of study early in their academic program.

1. High school diploma or equivalent.
2. Twenty-four semester hours of credit with grades of "C" or better in college level courses in the social sciences.

Much importance is attached to general background courses in the belief that they help to broaden the thinking and understanding of the student so that he will possess a wider range of ideas and interests and sounder judgment of social values than would otherwise be the case and, in consequence, will be able to render Government service of a higher level of value. For this reason, these requirements will not be waived.

With the approval of the Registrar of the Graduate School, credit may be given for not more than six hours of other courses which are considered to be of value in connection with work in public administration (such as English literature, composition, philosophy, mathematics, or natural sciences). Introductory courses in the following must be taken:

American or European Government or Political Science
Economics

American or European History
Public Administration

3. Twenty-four semester hours of credit with grades of "C" or better in undergraduate and graduate courses in public administration, excluding all accounting courses except Federal Government Accounting. The 24 credit hours are to be distributed as follows:
 - a. A minimum of nine credits from the Division of Organization and Management.

- b. The remaining fifteen credits may be selected from the Divisions of General Administration, Financial and Budgetary Administration, Personnel Administration, Legal Administration, Procurement and Property Management, or additional courses in the Division of Organization and Management. Students are advised to include in their programs at least one course from each Division.
- c. Upon prior approval by the Registrar, credit for courses outside the Department of Public Administration (including not more than two courses in office techniques and operations) may be applied when such courses are properly in line with the student's major interest.
- d. When a student has completed the social science requirements and fifteen hours in public administration courses, he should review his course of study with the Registrar.

Requirements—Graduate Study

Students seeking this statement should consult with the Registrar and obtain approval of their proposed course of study early in their academic program.

- 1. Bachelor's degree. This requirement will be waived only in very exceptional cases when the student can offer educational accomplishments substantially equivalent to a Bachelor's degree and when he has demonstrated by appropriate examination the breadth of knowledge equivalent to such a degree in the social sciences.
- 2. Twenty-seven semester hours of credit with grades of "B" or better in advanced undergraduate and graduate courses in public administration, of which twelve hours of credit shall be for courses numbered 500 and above, and excluding all accounting courses except Federal Government Accounting. The 27 credit hours are to be distributed as follows:
 - a. A minimum of ten credits from courses in the Division of Organization and Management.
 - b. Fourteen credits selected from the Divisions of General Administration, Financial and Budgetary Administration, Personnel Administration, Legal Administration, Procurement and Property Management, or additional courses in the Division of Organization and Management. Students are advised to include in their programs at least one course from each Division.
 - c. Three hours of credit for the course, Readings and Papers in Public Administration.

- d. Upon prior approval by the Registrar, credit for courses outside the Department of Public Administration may be applied when such courses are properly in line with the student's major interest.
- e. When a student has completed fifteen hours in public administration courses, he should notify the Registrar so that he may be assigned to an adviser.

CERTIFIED STATEMENT OF ACCOMPLISHMENT WITH HONORS

Students who complete the course requirements for the certified statement of accomplishment in public administration, undergraduate or graduate study, with an average of "B" or higher are given an opportunity to qualify for honors by passing an oral examination. The examination is given by a panel set up by the Graduate School. Students who wish to take the examination should apply to the Registrar at the completion of their programs.

GENERAL ADMINISTRATION

COMMITTEE

DAVID S. BROWN (Chairman)

JOHN J. CORSON

A. R. MILLER

MARTIN KRIESBERG

These courses offer a general understanding of American government and the fundamentals of public administration. In them a special emphasis is placed on the relationships of citizens and public employees.

A student who plans to take work in any of the divisions of the department will find that the specialized courses are more meaningful and useful if he has first completed the basic courses in this Division.

6-341. American National Government

Fall, 2 credits. Repeated in Spring and Summer

MARTIN KRIESBERG

History and origins of the national Government of the United States; the political process—parties and elections; the legislative process; the functions of the national Government and their administration; courts and judicial review of legislation. Students are advised to take this course before Introduction to Public Administration.

6-344. Introduction to Public Administration

Fall, 3 credits. Repeated in Spring and Summer

DAVID S. BROWN
LYNN W. ELEY

This course is designed to introduce the student to the elements of public administration. Attention will be devoted to the evolution of administrative organization; organizational types: staff, line, and auxiliary agencies and functions; controls of administration; the broadest aspects of personnel selection, classification, training, movement, and relations; budgeting and fiscal control;

federal-state relations; administrative legislation and adjudication. The object of the course is to lay a broad foundation for more intensive courses in management. *Prerequisite:* A course in American National Government.

6-351. Political Parties

Fall, 2 credits (alternate years)

CHARLES W. SMITH, JR.

The nature of political parties; the background of party division; party organization; presidential campaigns; propaganda techniques used to gain votes; the prediction of election results; sectional interests in politics; political leaders, demagogues, city machines, rural politics. *Prerequisite:* A course in American government, or at least one year of college work.

6-400. Administrative Operations for Congressional Assistants

Spring, 2 credits (alternate years)

JEROME N. ELLER

This course deals with the practical administrative problems encountered by secretaries and other staff assistants to U. S. Senators and Congressmen. Such matters as the following are considered: organization of office routine; preparation and distribution of newsletters and publicity releases; special services available to members of Congress; the use of Senate and House Documents and reports; relations with the Executive departments; pressure groups; relations with constituents; the practical workings of Congress; assistance with legislative matters.

6-453. Human Relations in Administration

Fall, 2 credits

E. GRANT YOUNG

The purpose of the course is to orient the student to the structure of interpersonal relations in bureaucratic organizations. The elements of the course are: the development of the sociology of administration; the rise of bureaucracies; the *Gemeinschaft* and *Gesellschaft* mentality; the social organization of private and public bureaucracies; the formal organization of management; the informal organization of workers; the structure of power and authority; work roles, positions, and status; role-taking, motivation, and morale; the social adjustment of the worker; the social skills of the supervisor and the executive.

6-457. Development of Public Administration in the U. S.

Spring, 3 credits

JOHN L. McGRUDER

Designed to help the student of U. S. federal administration understand present day institutions through study of their origins and growth. U. S. administration in theory, practice, and in the light of related history. Administrative problems, developing concepts and practices of public management, impact of personalities on administration. Students taking the course for credit will prepare a paper devoted to an individual, governmental unit, or other topic of significance to the development of public administration in the United States.

6-465. Comparative Administration

Fall, 3 credits

JOHN L. McGRUDER

This course is intended to acquaint the student with the various ways in which modern governments conduct their administration and seeks to facilitate the making of significant comparisons. It includes most of the major states of the world. The first half of the semester is devoted primarily to a descriptive presentation of the subject administrations, while the latter portion of the semester takes up an analytic study of the major administrative functions in the several governments. The course presumes a basic knowledge of the principles of public administration and their practice in the United States.

6-515. The Legislative Process

Spring, 3 credits

LEWIS J. LAPHAM

Information about the legislative process which will tend to facilitate effective cooperation between the personnel of the Legislative and Executive Branches. The functions of Congress; organization of Congress; consideration of bills in committees; consideration of bills on the floor; party leadership in Congress; the functions of the Executive regarding legislation; assistance by executive agencies in the legislative process; relation of non-governmental groups to legislation; legislative staff aids; congressional investigations of executive agencies as a control mechanism; correspondence, informational, and informal relations between Congress and executive agencies.

To give vitality and practical value to the subject, basic orientation lectures will be supplemented by seminar sessions, visiting experts, visual aids and planned laboratory techniques designed to provide active student participation in Congressional processes. *Prerequisite:* A course in American government, or experience in legislative-executive relationships.

6-545. Administrative Leadership

Fall, 3 credits. Repeated in Spring

DAVID S. BROWN

A study of the role of the administrator in public administration at all levels from the division chief up. Analysis of the role, responsibilities and nature of the administrator; of his influence on the organization and the influence of the organization upon him. Consideration of authority and its use.

Consideration of the ways the administrator accomplishes his objectives including analysis of his responsibilities for planning, communication, the development of people, leadership and the maintenance of organizational equilibrium. Special attention is devoted to contrasts between public and private administration. *Prerequisite:* Principles of Scientific Management or equivalent in training or experience.

6-600. Readings and Papers in Public Administration

Fall, 3 credits. Repeated in Spring

JOHN H. THURSTON, Coordinator

Under the guidance of a senior administrative official, supervised readings with monthly conferences on specified topics of administration or individual research and a paper on some problem or phase of administration. Readings or problem to be investigated are determined in consultation with adviser. *Prerequisite:* Completion of all other requirements for the undergraduate or graduate certified statement of accomplishment in public administration. The course may be taken, with the approval of the coordinator of the course, by students who are not candidates for certified statements if they have the equivalent background in public administration.

ORGANIZATION AND MANAGEMENT

COMMITTEE

JOSEPH P. LOFTUS (Chairman)

N. ROBERT BEAR
HARVEY E. BECKNELL
WILLIAM A. GILL
EDWARD W. HARDING
MARK M. KIRKHAM

ARTHUR JEBENS
DAVID LEVINE
HAROLD A. STONE
BEN M. WILLIAMS
JOHN D. YOUNG

These courses are offered to give students an opportunity for progressive study and advancement in the general field of organization and management. The courses use to advantage, among

other background data, the instructional and case materials developed by the Bureau of the Budget and by other Governmental agencies.

6-405. Principles and Techniques of O & M Work

Year, 2 credits each semester

DAVID D. LEVINE and JOHN D. YOUNG

Deals with the principles and techniques employed in surveying and analyzing organization and methods problems and in formulating solutions to such problems. Emphasis on planning and conducting procedures surveys; methods and approaches in analyzing and planning organization structures including analysis of the impact of individual and group behavior on formal organization structures and authority; methods of dividing work (production planning) and controlling work flow (production control); relationship of the scientific method to O and M work; analysis of staff and line concepts and relationships including the problem of overcoming resistance to new methods and procedures. *Prerequisite:* Experience in O&M work.

6-450. Principles of Scientific Management

Fall, 3 credits

JOSEPH P. LOFTUS

Common functional elements of management. Definition of objective; organization; planning; coordination of execution through schedules, budgets, reports, and measurement of progress. Types of motivation. Historic management types. Types of organization. Personal relations and community relations in the several management types. Origin, nature and development of scientific management. Application of scientific management in enterprises outside of government. *Prerequisite:* Bachelor's degree; or a course in American government or public administration and a course in social science.

6-519. Work Standards and Work Measurement

Fall, 2 credits. Repeated in Spring

ECKHARD BENNEWITZ and BEN POSNER

A study of the most advanced techniques of scientific management concerned with development of work standards and measurement of work loads and performance, and of their adaptability in public administration. Statistical and experimental methods of determining standards. Dangers to avoid in setting standards. Time study. Standards as a dynamic part of operations, and a tool in developing policies on personnel placement and training. Standards as aids in developing budgets, in planning operations, and in individual work planning. Importance of dependable standards, measurement and appraisal of performance to summary statements of progress for the use of higher administrative officials. *Prerequisite:* Practical working experience at Grade GS-7 or above, or permission of instructors.

6-540. The Application of Scientific Management in Public Enterprise

Spring, 3 credits

PHILIP C. WARD

The influence of underlying economic and social forces on organized conduct of public affairs. Major types of public agencies and basic differences between these types. Origin of purpose and policy in public enterprise. Comparison of public and private enterprise as to motivation, objectives, establishment and operation. Criteria of the quality of public administration. Application of scientific principles in the management of public enterprise, including case studies of representative organizations and operations. *Prerequisite:* A course in public administration, scientific management, or O&M analysis.

6-550. Techniques of Organization

Spring, 3 credits

PERRY R. TAYLOR

Organization of public agencies and development of procedures for getting work done. The character of management tools in government and in private industry from point of view of middle-management and supervisors. The relations of major subdivisions to top administration and to coordinate subdivisions. Problems of coordination in a decentralized organization geographically dispersed. Importance of clear definition of responsibilities and of vertical and horizontal relations. Coordination of activities, policies and objectives of components parts of an organization. *Prerequisite:* A course in public administration, scientific management, or O&M analysis.

[6-585.] Establishing and Administering O & M Work (Not offered in 1954-55)

Fall, 2 credits

Instructor to be announced

FINANCIAL AND BUDGETARY ADMINISTRATION**COMMITTEE****JOHN L. WELLS (Chairman)**CHARLES L. GRANT
FRED A. McNAMARADAVID H. SPANIER
FRANK H. SPENCER

Students desiring a knowledge of how the Government obtains, budgets and manages its money will find helpful some of the courses in general administration as well as the specialized courses in this division. Those with limited experience in this field should begin their study with Federal Budgetary Procedure in the Division of Office Techniques and Operations, and the general administration courses before attempting the advanced course in Budgetary Administration.

The courses in hospital administration are designed for persons who are engaged in hospital or health administration in either private or government agencies. The two courses in Hospital Business Administration offer training for those who are concerned with the financial administration of hospitals: accounting, statistics, and budgeting. The general course, Hospital Administration, deals with the over-all management of the hospital as a whole and its various services.

6-360. Hospital Business Administration I: Accounting, Statistics and Finance

Fall, 2 credits

DAVID H. SPANIER

Principles of hospital fund accounting: general fund income, expense and balance sheet accounts; temporary and endowment fund accounts; plant fund accounts. Adjusting and closing entries; prepaid and deferred items; preparation of trial balances. Hospital patient and hospital service statistics. Hospital financial and statistical statements. Cash receipts and accounts receivable procedures. Cash disbursements and accounts payable procedures. Inventories. Credits and collections. Payroll and personnel procedures. Check lists of equipment and supplies; depreciation; reserves. *Prerequisite:* Principles of Accounting or the equivalent in experience.

6-361. Hospital Business Administration II: Cost Analysis Methods and Budgeting

Spring, 2 credits

DAVID H. SPANIER

Principles of hospital cost analysis methods, rate structures and budgeting. Detailed cost analysis problems, organization of accounting department, principles of internal control and food cost accounting. *Prerequisite:* Hospital Business Administration I or its equivalent in experience.

6-461. Hospital Administration

Year, 4 credits

FRED A. McNAMARA and PIERRE S. PALMER

A course designed for those desiring to acquire a broad knowledge of the field of hospital administration. The first semester deals with the history of hospitals; the scope and organization of voluntary and Federal hospital programs; general principles of organization as applied to both Federal and voluntary hospitals; the functional elements of hospitals; and application of modern management tools in hospital administration. The second semester deals with additional examples of the application of modern management tools in hospital administration; control of quality of professional care of patients; management problems in such areas of hospital administration as food service, supply management, and length of patient stay; and problems of coordination of Federal hospital operating and construction programs.

The course is conducted through lectures and discussion periods. Guest speakers from Federal and voluntary hospitals present several of the topics. Credit is given only upon completion of both semesters and registration is limited to those planning to take both semesters. *Prerequisite:* Familiarity with hospital operations.

6-635. Budgetary and Financial Administration

Fall, 2 credits

JOSEPH C. WHEELER

This is an advanced, one-semester course for experienced budget and administrative personnel. Covers the broad phases of budgetary and financial administration in the Federal Government primarily from the standpoint of the operating departments. Emphasizes the role of budget formulation and execution in the relationships between the legislative and executive branches of the Government and among the staff operating agencies within the executive branch. The first half of the course deals with the pre-appropriation phases of budgeting, including formulation, review, and congressional enactment of the budget. Topics discussed include: the role of budgeting in program formulation; the role of bureaus, departments, Bureau of the Budget, the President and Congress in budgeting; content of the budget and of departmental estimates and related budgetary materials. The second half of the course deals with the execution of the budget after it is enacted by Congress and the relationships of administrative planning and control, accounting, auditing, and financial reporting to budget execution. *Prerequisite:* Bachelor's degree and an introductory course in public administration; or experience at a responsible level in budgetary, financial or general administration; or consent of instructor.

PERSONNEL ADMINISTRATION

COMMITTEE

JAMES L. BUCKLEY (Chairman)

MILDRED C. BENTON

VIRGIL L. COUCH

C. O. HENDERSON

G. E. HILBERT

HAROLD LEICH

ROSS POLLOCK

JOSEPH E. WINSLOW

The student is urged to take the introductory course in public administration before concentrating on the program in this divi-

sion. Unless substantial experience can be substituted, the general course, Public Personnel Administration, should be taken before the specialized courses (such as Position Classification, Selection and Placement, etc.). Persons who are in positions classified at GS-5 or below and desire to prepare for personnel work should begin with Federal Personnel Procedure in the Department of Office Techniques and Operations. They should not attempt to take the specialized courses until they have gained substantial experience in personnel work or have completed all basic, general courses.

6-430. Public Personnel Administration

Fall, 2 credits. Repeated in Spring

JERRY C. DOSTER

Designed for supervisors and administrators wishing to have general familiarity with personnel work, for those in junior personnel staff positions desiring a broad understanding of personnel administration, and for those desiring to enter the field who need a foundation for the more specialized courses in the personnel field. Personnel problems which arise when people are associated together in a work situation; basic personnel policies and practices necessary and useful in treating personnel problems; differences between responsibilities, with respect to personnel administration, of the supervisor and the personnel officer; the various phases of personnel work; study of merit system and forms of organization; civil service legislation at various governmental levels; relationships between the Civil Service Commission and operating agencies and personnel offices of latter; trends in public personnel administration and its relationship to overall management. *Prerequisite:* One of the following: Introduction to Public Administration; Course 108 or 114 in the Department of Office Techniques and Operations; Grades GS-4 or above in personnel work; 60 semester hours of college work.

6-435. Selection and Placement

Fall, 2 credits

RAYMOND L. RANDALL

Survey of the historical development and current thinking and practices in recruitment, selection, and placement of employees, with special reference to the Federal civil service. Emphasis in lectures and discussion is directed toward understanding basic principles which underlie policies and methods in public employment, with only incidental attention to the development of skills in such specific techniques as interviewing, examination preparation and administration, and reemployment investigation. The course is intended for students who wish to understand the "why" of public selection and placement procedures, rather than for those primarily interested in how such procedures are carried out. *Prerequisite:* One of the following: Course 344 or 430 in Public Administration; Grade GS-4 or above in personnel work; 60 semester hours of college work.

6-444. Position Classification

Fall, 2 credits. Repeated in Spring and Summer

WILLIAM C. LAXTON and JOSEPH P. FINDLAY

Covers the fundamental concept of position classification and its uses; relation of classification to compensation and other phases of personnel management; analysis of Classification Act of 1949; identification, analysis and application to specific positions of factors determining class and grade levels; discussion of job evaluation techniques; and application of position classification in the Federal service including operating policies, practices and procedures. *Prerequisite:* One of the following: Courses 344 or 430 in Public Administration; Grade GS-4 or above in personnel work; 60 semester hours of college work.

6-448. Wage Administration

Spring, 2 credits

THOMAS T. TOWNSEND

Basic concepts of and organization for wage administration in the Federal Government; brief history of the laws, orders, regulations and decisions that affect wage rate setting and the administration of wage rates; wage policies and procedures of departments and agencies that are major employers of "blue collar" workers; impact of wage stabilization on administration of wage programs. Provision for participating in practical work assignments.

6-468. Contemporary Trends in Labor Relations

Year, 2 credits each semester

FRANCIS X. MCCARTHY

Review of the history, economics, and statutes which have brought about the present labor-management relationship. Study and discussion of labor relations in certain government agencies and in several private plants. Study and discussion of various types of employer-employee problems in the Federal government. Study of the current aims of some of the larger unions and of current action by several leading industrial firms. Review of the Labor-Management Relations Act of 1947 (Taft-Hartley Law), its meaning as a trend in labor relations, its accomplishments and weaknesses. Future trends in labor-management relations. *Prerequisite:* GS-4 or above in personnel administration, O&M, or general management; or 60 semester hours of college work; or consent of the instructor.

6-620. Administration of Training

Fall, 2 credits

E. R. DRAHEIM

Designed to give special assistance in training administration to present or potential training officers and to administrators and supervisors who do not have the services of a training officer. Training as a tool of management; the administration of training; organizing to get training done; group dynamics—the use of group participation and judgment in planning for and getting training done; career development—the individual's part in his own development; the supervisor's job in developing employees; application of the laws of learning to in-service training; review and demonstration of the use of some of the methods for effective training; techniques and devices to get quick acceptance of ideas; training administrators and supervisors to select and use those methods, techniques and devices which are the best for given situations; methods of evaluating training programs and techniques.

6-670. Executive Selection and Development

Fall, 3 credits. Repeated in Spring

RAYMOND L. RANDALL

The philosophy and techniques governing the selection and development of government executives. The special problems of the government executive vis-à-vis his industrial counterpart. The following specific techniques are discussed: How to determine long-range needs for executives; how to analyze the labor market; how to select new executives from within the organization; how to identify potential executive talent at an early stage; how to develop such talent through the use of committee assignments, assistant-to positions; rotation, counseling, and special-purpose training; how to create and organize an executive reserve; how to make a replacement inventory. Case histories of industrial executive development programs are used.

Designed for those who have responsibilities for selection of broad-gauge generalists to guide the work of divisions, bureaus, or departments.

LEGAL ADMINISTRATION

COMMITTEE

ASHLEY SELLERS (Chairman)

THOMAS J. FLAVIN

RALPH F. KOEBEL

DAVID REICH

6-320. Introduction to Administrative Law and Procedure

Fall, 2 credits

EDWARD C. JOHNSON

A survey, for the general student, of the nature of administrative law, its subject matter, and methods of administration. The rule-making and adjudicative or determining procedures by federal and state regulatory agencies and the remedies against administrative action receive special consideration.

The increased complexity of modern society has meant that administrative tribunals have played an expanding role in the regulation of life and property. This course includes a study of the law which controls and the regulations which are made by governmental officers to implement that law. A survey of economic and social forces involved in regulatory action. Material used includes regulations, orders and decisions of federal, as well as state and municipal bodies, which acquaints students with current developments in administrative law and procedure. Topics covered include: powers and duties of administrative authorities as they relate to the supervision of public, as well as private interests; means of enforcing decision; remedies against official action; legal qualifications for office; legal disqualification of officers; appointment, tenure, removal and compensation of officers; and related matters.

6-422. Business Law

Year, 2 credits each semester

EDWARD C. JOHNSON

Aspects of law essential to the conduct of modern business. Forms of business organization, bailments, property, sales, mortgages, negotiable instruments, contracts. This course is so arranged that students may attend both semesters or either semester. No subject matter, however, will be repeated.

6-425. Legal Aspects of Investigation—Criminal Evidence and Procedure

Spring, 2 credits

RALPH F. KOEBEL

Designed to provide investigative personnel and those desiring to prepare for such work, a background and insight into the legal aspects of their investigations: what types of evidence to seek; circumstances and conditions under which the evidence is to be obtained in order to have adequate probative value; and how to prepare such evidence for presentation in court or other procedure. Since all investigations are potential sources of prosecution, the requirements of criminal evidence and procedure often reach into the early stages of investigation. The instruction is designed to provide understandable information without overemphasis of technical aspects.

6-452. American Constitutional Law

Fall, 2 credits

NORMAN J. SMALL

Acquaints the student, through consideration of significant Supreme Court decisions, with the meaning accorded to, and the scope of government power derived from, pertinent constitutional provisions. Topics covered by the cases to be considered include civil liberties; civil rights; due process of law; powers of the Federal Government to tax, spend, conduct foreign relations, regulate commerce; regulatory powers of the states; delegation of legislative power; the investigatory power; political questions; and judicial review. *Prerequisite:* A course in American government.

6-480. Copyright Law

Spring, 2 credits (alternate years)

LOUIS C. SMITH

Fundamentals of the law of copyright. Covers broadly the subject of legal protection afforded an author's writings, both textual and pictorial. Special emphasis on the history of copyright law in the United States; copyright relations with foreign countries; the procedure to secure copyright; the practices, rules and regulations of the United States Copyright Office; the rights of a user of an author's work; assigning and licensing copyrights; the infringement of copyright and its penalties; and a study of the problems which have arisen in the fields of motion pictures, radio and such new media as microfilm, television and ultrafax, as well as other subject matter of copyright including books, periodicals, works prepared for oral delivery, music and works of art.

Special consideration given to Government publications; the United States Government as copyright owner and as user of copyrighted works; and copyright problems which may directly affect the Government employee. *Prerequisite:* College degree or equivalent experience.

6-485. General Legal History

Fall, 2 credits

LOUIS C. SMITH

A general survey of the origin and development of law, and of legal systems in the ancient, mediaeval, and modern world, including the Egyptian, Babylonian, Hebrew, Greek, Roman, Hindu, Chinese and Anglo-American legal systems. The science of jurisprudence, Rousseau's "Social Contract Theory," present-day court procedure in some of the world's leading countries and other topics of interest in the law are included in the course. Special emphasis is placed upon the relation of the background data to the practical problems of the day.

[6-680.] Administrative Law (1955-56 and alternate years)

Spring, 2 credits

THOMAS J. FLAVIN

6-820. Problems of Federal Administrative Regulation

Spring, 2 credits (alternate years)

THOMAS J. FLAVIN

A seminar for advanced students using the case approach to consideration of the Administrative Procedure Act and its application to all areas of Federal regulation covered in that Act. *Prerequisite:* Extensive experience in regulatory work, with approval of instructor; or a degree in law, public utilities or public administration.

PROCUREMENT AND PROPERTY MANAGEMENT**COMMITTEE**

JOHN B. HOLDEN (Chairman)

CLIFTON E. MACK

JAMES SCAMMAHORN

FRANCIS R. MANGHAM

S. A. SNYDER

RALPH G. MCINTYRE

FRANK H. SPENCER

RAY WARD

Courses in this field deal with how the Government purchases, manages and accounts for materials and supplies. Those interested in purchasing but with limited experience in such work will find it helpful to begin with the courses in Federal Purchasing Procedure and Federal Property Procedure before attempting the management courses.

Selected background courses in public administration together with courses in the Division of Organization and Management will provide a thorough training in administration in this area.

8-405. Principles of Specifications (See p. 94)

8-420. Fundamentals of Standardization (See p. 94)

6-455. Management of Governmental Supply

Spring, 2 credits

JOHN B. HOLDEN

An advanced course covering the broad phases of handling and managing Government supply activities. Deals with supply policies, organization and management, finances, and laws governing supply. Topics: (1) organization and management of purchasing offices; (2) organization and management of warehouses; (3) property accounting, management and distribution of supplies and equipment; (4) management and training of purchasing and warehousing personnel; (5) procurement function efficiency determination and importance of project service objective and its relation to good Government purchasing and warehousing; (6) decisions of the Comptroller General and regulations affecting procurement; (7) nature of public contracts as compared with private contracts; (8) Federal Specifications and specification studies, including development and writing; (9) delivery requirements, inspection of supplies and liquidated damages; (10) market analysis and conditions which affect seasonal project work of Government bureaus; (11) laws which affect procurement contracts such as Walsh-Healey Act, Davis-Bacon Act, Eight-Hour Law; (12) functions of General Accounting Office, Federal Supply Service, Federal Prisons Industries and surplus disposal agencies in the supply scheme; (13) traffic problems and transportation studies on methods of shipment; (14) new developments in procedures affecting supply and dissemination of information to field supply units. *Prerequisite:* One of the following: Introduction to Public Administration; Federal Purchasing Procedure; Federal Property Procedure; Grade GS-4 or above in purchasing work; 60 semester hours of college work.

6-638. Government Defense Contracts

Fall, 2 credits

JULIUS SILVERSTEIN

Laws and problems in defense contracting by the Federal Government, including such subjects as cost-plus contracts, contingent fees, priorities, subcontracting, escalation, financing, renegotiation, contract termination, and surplus property.

ACCOUNTING

COMMITTEE

JOHN C. COOPER (Chairman)

PAUL L. APPLEMAN
KARNEY A. BRASFIELD
ROBERT H. FUCHS
WARNER H. HORD

LAWRENCE O. MANLEY
CHARLES N. MASON
ROBERT W. MAXWELL
HERSCHEL C. WALLING

The Graduate School offers accounting courses primarily as a means of training for the *public* service. The curriculum necessarily includes courses in general accounting because the basic principles are essential for Government accounting.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN ACCOUNTING

The scope of accounting in the Federal service is wide. There are increasing demands for accountants having a knowledge of commercial as well as Government accounting. These demands have come as a result of the formation of many Government corporations and Federal regulatory agencies. Hence, the accounting pro-

gram required for a Certified Statement of Accomplishment is broad enough to cover not only the regular appropriation accounting of the Federal Government, but also the accounting training needed for many other governmental activities. The program is comprehensive enough both to provide advanced training for the Government service, and also, if courses are carefully selected, to meet the usual educational requirements for C.P.A. examinations. Students planning to take C.P.A. examinations should know the requirements of the state in which they plan to take the examination. In general, their study, in addition to accounting, should include the following: Principles of Economics, Corporation Finance, Investments, Mathematics of Accounting and Investment, Business Law, Statistics, Business English, Principles of Marketing and Industrial Management.

Requirements for Certified Statement

1. High school diploma or equivalent.
2. Thirty-six semester hours of credit with grades of "C" or better in courses outlined below and distributed as follows:
 - a. All of the required courses.
 - b. No less than three semester hours credit from the Accounting Elective Courses.
 - c. No less than six semester hours credit from the Related Elective Courses.
 - d. The remaining semester hours credit may be taken in either of the two elective groups.

REQUIRED COURSES

<i>Courses</i>	<i>Number of Semesters</i>	<i>Semester Hours Credit</i>
Principles of Accounting	2	6
Intermediate Accounting	2	6
Cost Accounting	1	3
Auditing	2	4
Advanced Accounting	2	6

ACCOUNTING ELECTIVE COURSES

Federal Government Accounting	1	3
Federal Tax Accounting	1	3
Analysis and Interpretation of Financial Statements	1	2
Mathematics of Accounting and Investment	1	3
Federal Accounting Procedure	1	3
Federal Auditing Procedure	1	2
or Advanced Federal Auditing Procedure	1	2
Budgetary Administration	1	2
Accounting Systems	1	2
Cost Accounting (Second Semester)	1	3

RELATED ELECTIVE COURSES

Business Law	2	1
Principles of Economics	2	6
Principles of Statistical Analysis	2	6
Writing Procedures and Instructions	1	2
or Introduction to Official Writing	1	2

6-352^a. Principles of Accounting—First Half

Fall, 3 credits. Repeated in Spring and Summer

HERBERT G. MARSHALL
WILLIAM H. ROWE
STANCIL M. SMITH

Elementary principles of accounting; discussion and problems. At the end of the semester students will be prepared to do the accounting necessary for a small business organization; i.e., keep a complete set of books, draw up statements at the end of the fiscal period, adjust the accounts for accruals, deferred items, depreciation, etc., and close the books. *Prerequisite:* High school graduation or equivalent.

6-352^b. Principles of Accounting—Second Half

Spring, 3 credits. Repeated in Summer and Fall

HERBERT G. MARSHALL
WILLIAM H. ROWE
STANCIL M. SMITH

Continuation of first half covering more advanced principles of accounting; accounting for partnerships, corporations and manufacturing; depreciation policies and analysis of financial statements. *Prerequisite:* First half or equivalent.

6-353^a. Intermediate Accounting—First Half

Fall, 3 credits. Repeated in Spring

BERNARD T. DODDER
WARNER H. HORD

Advanced principles of manufacturing accounting, corporation accounting, and valuation as applied to current assets, fixed assets, intangibles, and liabilities, reserves and funds, installment sales. *Prerequisite:* A first year course in accounting.

6-353^b. Intermediate Accounting—Second Half

Spring, 3 credits. Repeated in Fall

BERNARD T. DODDER
WARNER H. HORD

Advanced principles of partnership accounting, including formation, operation, and dissolution; joint ventures; consignments; agencies and branches; application of funds. *Prerequisite:* First half or equivalent.

6-354. Federal Government Accounting

Fall, 3 credits. Repeated in Spring

CHARLES N. MASON

A review of the development of the accounting system for Federal funds and the present financial organization in which the accounting is performed with attention to the accounting responsibilities of each segment of the organization, including the Treasury Department and the General Accounting Office. Detailed study is given to the accounting problems of administrative agencies with special emphasis on the principles of controls, financial reporting problems, and recent developments in accounting in the Federal government. *Prerequisite:* Two years of Commercial Accounting, or Federal Accounting Procedure and one year of Principles of Accounting or the equivalent.

6-420. Advanced Accounting—Theory and Problems

Year, 3 credits each semester

EDWIN T. NOLAN

A comprehensive study of advanced principles of accounting together with their application to specific problems. Special consideration is given to consolidated statements; foreign exchange; receivership; estates and trusts; public accounts. Emphasis is placed on problems in accounting theory and practice such as are generally given in C.P.A. examinations. *Prerequisite:* Intermediate Accounting.

6-423. Mathematics of Accounting and Investment

Spring, 3 credits

RALPH R. BOTTS

Calculation of compound interest, compound discount, sum of annuities, present value of annuities and perpetuities; accumulation of sinking funds and amortization of debts by installments. Calculation of bond yields, bond values, premiums and discounts. Computation of depreciation by sinking fund method and fixed percentage of book value method. Some study is given to life probabilities and the computation of premiums and reserves for the more common types of life insurance and annuities. Accounting applications and entries will be discussed for those students interested in the accounting aspects.

6-510. Analysis and Interpretation of Financial Statements

Spring, 2 credits

HERSCHEL C. WALLING

Study of the flow or movement of funds as reflected in the financial statements. Use of ratios and other indices in the analysis and interpretation of financial position together with a consideration of trends and variations therein. Subject matter is developed through lectures and problems, supplemented with published financial statements. Each student prepares, under supervision of the instructor, an analysis of the current financial statements of some prominent corporation together with a comparison with the principal competitors in the field. *Prerequisite:* Intermediate Accounting.

6-525. Financial Organization and Procedures of the Federal Government

Fall, 2 credits

CARL W. TILLER

A comprehensive summary presentation of Federal fiscal administration, presented primarily on a lecture basis, and including review of the roles of major participants: Treasury, GAO, Congressional Committees, Bureau of the Budget, and operating departments. Designed to provide an understanding of the financial organization and procedure of the Federal Government, including such subjects as the Government fund and account structure, and its revenue structure and administration. An orientation course for persons working in some part of the area of financial administration, such as budgeting or accounting, and for general or program administrators who wish an over-all picture of the financial structure of the Government.

6-642. Cost Accounting

Year, 3 credits each semester

HARRY W. RICE

A thorough and comprehensive treatment of the principles of cost accounting, together with the methods of their application to specific problems. By means of lectures, textbook study, and problems, full consideration is given to the methods of cost accounting for materials, labor, direct and indirect expenses in their relationship to specific job orders; process, departmental and standard costs; and the control accounts. *Prerequisite:* Principles of Accounting.

6-645. Federal Tax Accounting

Fall, 3 credits

EUGENE C. MOYER

Federal taxation presented from the accounting viewpoint. Special attention given to income taxation. *Prerequisite:* Principles of Accounting; accounting experience desirable.

6-693. Auditing

Year, 2 credits each semester

JOHN C. COOPER

The fall semester is devoted to the study of the fundamental principles of public or commercial-type audits. Consideration is given to the purposes and

types of audits; the responsibility of the auditor; planning and performing audits. Special emphasis is placed on problems in audit theory and practice such as are generally given in C.P.A. examinations.

In the spring semester, emphasis is placed on case studies in auditing and the application of audit principles. Special consideration is given to the field of internal audit as a tool of management and the utilization of internal audit in Government. *Prerequisite*: Intermediate Accounting.

6-694. Specialized Federal Accounting Systems

Fall, 3 credits

EDWIN T. NOLAN and SPECIALISTS

Designed to acquaint the students with the basic principles and standards for accounting in the Federal Government as promulgated by the Comptroller General, the reporting requirements of the Bureau of the Budget and Treasury Department and the development of improved systems by individual agencies within the over-all guidance. In addition to consideration of Government-wide developments, the systems of a diversified group of Federal agencies are used as case studies. *Prerequisite*: Intermediate Accounting, Federal Government Accounting, and Cost Accounting, or the equivalent.

6-695. Accounting Systems

Spring, 2 credits (alternate years)

EDWIN T. NOLAN

Classification of accounts. Planning, designing, and installation of accounting systems. Problems of management. Organization and correlation of the accounting department with other departments. Illustrative systems, showing forms and procedures for specific types of business, including financial institutions, insurance, department store, public utilities and Government.

Social Sciences

DEPARTMENTAL COMMITTEE

BUSHROD W. ALLIN (Chairman)

H. DUNCAN HALL
SHERMAN E. JOHNSON
PAUL E. NYSTROM
HAROLD B. ROWE

CARL C. TAYLOR
JAMES E. THIGPEN
HARRY C. TRELOGAN (Vice-chairman)
FREDERICK V. WAUGH

PURPOSE AND SCOPE

Social science deals with people and the problems of human relationships, as contrasted with natural or physical science which deals with things and the problems arising out of physical relationships.

The problems of social organization and operation have become both absolutely and relatively more important with the increase in complexity of our industrial civilization. More and more, people are concerned with the organization of production, the distribution of goods and income, and with price policies. The individual as a consumer and investor, the businessman and the farmer as producers, find increasing need for a knowledge of economics and other social sciences. Large corporations are employing growing numbers of economists to help in the formulation of policy. Psychologists and social workers are finding a demand for their services in personnel work. And, the large number of Federal, state and local government agencies need more people adequately trained in social science.

Social science is divided into a number of closely allied fields including economics, sociology, political science, history, law, and psychology. A broad grasp of any one of these subjects implies at least some familiarity with the others, because of the many interrelationships among these studies. Yet the continued development of each social science has given rise to larger and still larger bodies of knowledge relating to it, until only through a considerable degree of specialization can the student hope to master any one part. Thus the great need is for people who have concentrated sufficiently on one phase of a social science, such as marketing in economics, to be thoroughly familiar with the details of fact and principles involved, yet who also have a broad underlying training in the allied fields.

The courses offered by the Graduate School are designed to aid in acquiring a general background in the social sciences, as well as the specialized training in particular fields which is necessary for successful work in many Government departments and in private business.

SUGGESTIONS FOR PROGRAM OF STUDY

To meet the specific needs of students who have different educational and experience backgrounds and different immediate interests, the Graduate School has developed the following types of courses in the social sciences:

(1) *Courses of General Interest.* Several of the social science courses are designed to provide information of general interest to a large group of persons who do not expect to become specialists in a particular field, but who desire to obtain some background in a subject, as a basis for work in related fields, or purely as a personal interest. An employee in the personnel office of a Department of Agriculture branch responsible for market news and inspection services may wish to take a course in marketing in order to learn something about the subject matter dealt with by the personnel of the branch, or a course in psychology as an aid in dealing with the personal problems which are daily presented to employee counselors. The secretary to an economic research director may want a course in the principles of economics in order to become familiar with the terminology and general economic concepts to which her stenographic and filing duties relate. An almost unending array of job needs of this kind offers opportunities to the alert and ambitious employee to increase his capacity and usefulness to his employer. The many promotions within the Government service which can be traced directly to such training testify to the fact that study in the social sciences is profitable.

These courses of general interest are at the undergraduate level, such as Introductory Survey of Economics, Introduction to the Study of Human Relations, Introduction to Marketing, and General Psychology.

(2) *Undergraduate Basic Courses.* These courses are designed to provide a basic social science background for students who have not completed their undergraduate training or who have not had an opportunity to take the basic background work in economics and the other social sciences as a part of their qualification for Bachelor's degree work. These courses provide an opportunity for persons who enter the Government service in the lower grades to prepare themselves for professional advancement.

(3) *Graduate and Advanced Undergraduate Courses.* These courses offer work of graduate level but they are also open to undergraduates of advanced standing. Students who are registered for graduate credit will be expected to do more work in these courses than those who register for undergraduate credit.

(4) *Strictly Graduate Courses.* These courses are offered only for graduate students who have adequate background. They are

usually conducted on a seminar basis and they require a great deal of participation and preparation of material by the students themselves.

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GENERAL ECONOMICS

COMMITTEE

BUSHROD W. ALLIN (Chairman)

ROY J. BURROUGHS
JAMES P. CAVIN

HERMAN M. SOUTHWORTH
WALTER W. WILCOX

Adequate foundation training in general economics is essential for satisfactory accomplishment in the study of any specialized branch of the subject. Hence, the primary objective in developing the following list of courses has been that of providing the basic work needed, by students who wish to carry out a systematic plan of study, at both undergraduate and graduate levels. In addition, a course on research methods is listed under this head. It is of general interest to students majoring in economics.

7-110. Introduction to Economics

Fall, 2 credits. Repeated in Spring and Summer

GERALD M. FRANCIS

This course is especially designed for those who feel the need for more knowledge of modern economics, as well as for those who may later decide to elect the course in Principles of Economics. Whether one considers the activities and problems of individuals as consumers, as employees, as small enterprisers, or as citizens in a democracy, understanding of the current economic order rests upon a background of how it came to be. The student will become acquainted with the scope of economic study; its relation to other fields such as engineering, law, sociology; the meaning of economic "problems"; the processes of a free enterprise economy; what economic institutions are; and the steps by which the present economy grew.

7-201. Principles of Economics

Year, 3 credits each semester

ROY J. BURROUGHS and BUSHROD W. ALLIN

A basic course designed to equip the student with the simpler tools of economic analysis and with an understanding of the more important institutions of the economic system. Economic analysis is developed with respect to operations of the price system, behavior of individual consumers and business firms, and also the behavior of the total economy including the allocation of resources, the distribution of the total product to the factors of production and the conditions which favor high employment and a large national income. *Prerequisite:* A year of college work or its equivalent.

7-480. Money and Banking

Year, 2 credits each semester (alternate years)

RICHARD A. RADFORD

The principles of money. The value of money. Effects of changing price levels. Money, credit, and capital. Significance of the rate of interest. Fundamentals of monetary policy. Evolution of the banking system. The money-market. Principles of Central Banking. The Federal Reserve System. Quantitative and qualitative credit control. Banks and the creation of credit. Effects of the war on the banking system. Inflation and deflation. International

monetary standards. International monetary relations. *Prerequisite:* Principles of Economics or equivalent.

7-481. Business Forecasting

Fall, 2 credits

NATHAN M. KOFFSKY

National income analysis as a tool for forecasting economic fluctuations. The meaning of the Income and Product accounts and the data that underlie them. The impact of changes in spending by consumers, business, and government on the total economy. The data which give clues to such changes, such as the Federal Budget, business investment plans, and consumer behavior. The national product "gap" analyses as a tool in measuring the direction and extent of changes in economic activity. Brief review of business cycle theory and measurement, including the Historical School and the work of the National Bureau of Economic Research. Analysis of the President's Economic Report. Long-term projections of economic growth. *Prerequisite:* A course in elementary economics and a course in statistics.

7-548. Economic Analysis

Year, 3 credits each semester

WILLIAM A. VOGELY

The course is concerned with methods of economic analysis. Emphasis is placed upon the exposition and evaluation of theoretical models explaining the relationships among various sectors of the economic system. Empirical applications of these tools of analysis are studied. The first semester is primarily concerned with analyses of the behavior of firms, households, and industries. The theories of demand, production, distribution, and price are studied intensively, including systems of both partial and general interdependence. The second semester is primarily concerned with analyses of the behavior of economic aggregates. The theories of employment, national income, and economic development are studied, with particular attention to the contributions initiated by Lord Keynes. *Prerequisite:* A course in the principles of economics.

7-553. Problems of Economic Development

Fall, 3 credits

CHARLES WOLF, JR.

The course consists of three main parts. (1) Concepts, definitions, measures, and objectives of economic development. (2) The main characteristics of underdeveloped economies which provide the setting for the development problem. The characteristics discussed include population, resources, national income, savings, consumption, investment, public finance, and international trade and payments. (3) Specific problems of development, including entrepreneurship, technological change, the planning of development programs, foreign aid, and inflation.

7-560. Modern Economic Thought

Spring, 3 credits

BUSHROD W. ALLIN and JAMES P. CAVIN

A review of the ideas of the leading economic theorists of the past fifty years, including those of Marshall, Veblen, Commons, Mitchell, and Keynes. The purpose of the course is to help the student understand the relevance of the principal contributions of these men in dealing with the economic problems of the American economy.

7-570. Statistical Analysis Applied to Economic Problems

Year, 2 credits each semester (alternate years)

RICHARD J. FOOTE and KARL A. FOX

The first semester deals mainly with analytical tools for measuring demand, using the single-equation approach. Emphasis is placed on the cases for which single equations appear to be valid, on statistical considerations involved in set-

ting up the analysis and in interpreting the results, and on special problems involved in handling competing and complementary commodities. Topics considered in the second semester depend on the interest of students. Possible topics include an introduction to the use of simultaneous equations in demand analysis, use of economic models as guides to policy decisions, spatial equilibrium models, and applications of linear programming. *Prerequisite:* Principles of Economics and a course in statistics which included multiple regression analysis.

[7-712.] Research Methods in Social Sciences (1955-56 and alternate years)

Spring, 2 credits

O. C. STINE and SPECIALISTS

AGRICULTURAL ECONOMICS

COMMITTEE

BENNETT S. WHITE (Chairman)

PHILIP F. AYLESWORTH
FLOYD E. DAVIS
HORACE R. JOSEPHSON

H. M. SOUTHWORTH
ROBERT M. WALSH
EVERETT C. WEITZELL

The great importance of enlarging and improving knowledge of the economics of agriculture is generally recognized. Constructive accomplishment in this field requires thorough training in economics combined with a comprehensive grasp of its application to the special conditions of agriculture. Such a balanced combination can best be achieved by following a systematic course of study appropriate to the particular area of concentration desired. The courses offered by the Graduate School permit students to carry out such plans of study with concentration in the economics of agricultural production, agricultural finance, prices, and marketing. The electives and general interest courses provided also permit the adaptation of study plans to meet the special interests of individual students.

Shortage of well-trained marketing personnel, at both Federal and State levels, critically handicaps developing a well-rounded program under the Agricultural Research and Marketing Act. The greatest immediate need is for men with advanced training who can undertake independent work in new fields. The broad expansion of activities scheduled under the Act also will continue and intensify the need for adequately prepared college graduates. On both problems the Department of Agriculture is cooperating closely with land-grant institutions. Joint committees have analyzed and mapped out attack on these problems. As part of this plan the Graduate School has given special advanced training to Washington personnel engaged in marketing work, and regularly offers both introductory and advanced courses in this field.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN AGRICULTURAL ECONOMICS

The Graduate School offers a Certified Statement of Accomplishment to students who have completed 30 credits of graduate work in agricultural economics, including the basic graduate courses in economics. To qualify, it is necessary to follow the specific sequence of courses that are listed for three fields of concentration indicated below.

The Certified Statement of Accomplishment is not an advanced degree, but it constitutes evidence of completion of an organized course of study in the field of agricultural economics. It is a certification that the student has completed a program of study which prepares him for effective public service in agricultural economics work.

COURSES LEADING TO CERTIFIED STATEMENT OF ACCOMPLISHMENT IN AGRICULTURAL ECONOMICS

(With Concentration in Specified Fields of Application)

BASIC UNDERGRADUATE COURSES

Required foundation courses. Carry undergraduate credit only and may not be used to meet the credit hour requirement for the certified statement. Equivalent courses will be accepted by transcript from other institutions.

The number in parenthesis after course title indicates semester hour credits.

<i>Economics of Production</i>	<i>Agricultural Finance</i>	<i>Prices and Marketing</i>
Principles of Economics (6)	Principles of Economics (6)	Principles of Economics (6)
Principles of Statistical Analysis (6)	Principles of Statistical Analysis (6)	Principles of Statistical Analysis (6)
Economics of Farm Production (3)	Economics of Farm Production (3)	Economics of Farm Production (3)
Introduction to Marketing (3)	Introduction to Marketing (3)	Introduction to Marketing (3)

REQUIRED BASIC GRADUATE COURSES

Economic Analysis (6)	Economic Analysis (6)	Economic Analysis (6)
Money and Banking (4)	Money and Banking (4)	Money and Banking (4)

REQUIRED SPECIALIZED GRADUATE COURSES

Farm Management (2) or Land Economics (3)	Agricultural Finance (3)	Economics of Marketing (4)
Agricultural Policies (2)	Farm Management (2) or Land Economics (3)	
Economics of Production (2)	Agricultural Finance (3)	Agricultural Policies (2) Marketing Seminar (2)

ELECTIVE GRADUATE COURSES

Select courses in consultation with Graduate School advisers to complete the 30 graduate credits required for certified statement of accomplishment.

[7-203.] Introduction to Marketing (1955-56 and alternate years)

Fall, 3 credits

BENNETT S. WHITE

7-207. Economics of Farm Production

Fall, 3 credits (alternate years)

KENNETH L. BACHMAN and RUSSELL W. BIERMAN

Designed to develop the economic principles of production and to relate these principles to practical farm problems; including their application in the determination of the proper combination of production resources, the selection of enterprises and the explanation of variation in agricultural production in different areas. A brief survey of the application of such principles in achieving optimum production.

7-409. Farm Management

Spring, 2 credits (alternate years)

WYLIE D. GOODSSELL

An advanced course in farm organization and management which combines development of economic principles of farm production with practical application to the planning and operation of farms of different types, sizes, and locations. The practical and theoretical aspects of purchasing, organizing, operating, and managing farms are treated. Consideration is given also to economic adjustments needed in specific farming areas and for the nation. *Prerequisite:* Economics of Farm Production, or equivalent.

7-410. Land Economics

Fall, 3 credits (alternate years)

V. WEBSTER JOHNSON

A survey of economic principles governing utilization of major land types, including an appraisal of present land resources and future need for various types of land and land uses; traditional practices and customs that affect land use; private and public land ownership and tenancy relationships; problems of new settlement; land income under different conditions of ownership and management; and various state and local measures for the direction and control of land use and occupancy. *Prerequisite:* Principles of Economics and experience as approved by instructor.

[7-411.] Agricultural Finance (1955-56 and alternate years)

Fall, 3 credits

DONALD C. HORTON

[7-412.] Risk and Insurance (1955-56 and alternate years)

Spring, 3 credits

DONALD C. HORTON and RALPH R. BOTTS

7-414. Economics of Marketing

Year, 2 credits each semester (alternate years)

H. M. SOUTHWORTH and HARRY C. TRELOGAN

An advanced course in which economic aspects of marketing agricultural commodities are systematically analyzed, with main emphasis on applying modern economic concepts to the successive problem areas developed. The first semester considers marketing, including transportation, storage, processing, and distribution, as a process of production. It explores the use of resources in this production, the effects of market institutions and organizations upon the use of resources and the productive services performed, and the criteria of efficiency of this productive process and of public policy designed to improve it. The second semester considers the market as a mechanism for establishing prices. It explores the functions of market prices, the process of price-making, the effects of market organization and practices, and the relationships between margins and the costs of productive services in marketing, and the criteria of efficiency in price-making and of public measures that regulate or intervene in the price-making process. *Prerequisite:* Principles of Economics and Introduction to Marketing, or equivalent as approved by instructors.

[7-416.] Agricultural Cooperation (1955-56 and alternate years)

Spring, 3 credits

MARTIN A. ABRAHAMSEN and STAFF

7-716. Agricultural Policies and Programs—Seminar

Fall, 2 credits

KARL A. FOX and SPECIALISTS

Analysis and evaluation of current agricultural policies and programs in terms of economic principles, the nature of production and marketing problems in agriculture, and the relation of agricultural policies to the dynamic forces in our national economy at the present time. Major attention is given to farm price support and stabilization programs. *Prerequisite:* A college degree in agriculture or a related field with some courses in economics, or operational responsibility in an agricultural program.

[7-719.] Resource Utilization Problems and Policies (1955-56 and alternate years)

Fall, 2 credits

V. WEBSTER JOHNSON and HORACE R. JOSEPHSON

7-720. Economics of Production—Seminar

Spring, 2 credits (alternate years)

SHERMAN E. JOHNSON and ASSOCIATES

A seminar dealing with special problems in the broad field of economics of production. Students prepare papers on problems of interest in their special fields. Different research workers and administrators participate in the discussion of current problems under the guidance and coordination of the instructor. *Prerequisite:* Graduate work in agricultural economics.

[7-721.] Agricultural Finance (1955-56 and alternate years)

Spring, 3 credits

NORMAN J. WALL and RUSSELL C. ENGBERG

[7-722.] Marketing—Seminar (1955-56 and alternate years)

Spring, 2 credits

HARRY C. TRELOGAN

TRANSPORTATION**7-145. Principles of Transportation**

Fall, 2 credits. Repeated in Spring

JAMES F. PERRIN

The historical development of transportation from the earliest time to the current transportation system in the United States. Methods used for performing transportation, the services rendered by the transportation agencies, and distinctions between those services. Terms and definitions used in describing transportation services as compared to the pricing of goods.

7-245. Transportation Rates and Rate Determination

Spring, 2 credits

ABBEFORD S. DOLCH

The use of traffic documents, commodity classifications, tariffs, and traffic publications for the several forms of transportation. Study of rate principles and the history of major rate adjustments. *Prerequisite:* Principles of Transportation, or experience in rates and rate determination.

7-246. Traffic Management

Fall, 2 credits

JAMES F. PERRIN

Designed to acquaint transportation students with the principles and practices of traffic management from both Governmental and commercial points of view. Emphasis on functions of a traffic department, both industrial and Governmental, and on relations between carriers and traffic departments, with a

considerable portion of the emphasis placed on transportation law. *Prerequisite:* Transportation Rates, or experience with rates and tariffs, or permission of instructor.

7-468. Current Transportation Problems

Spring, 3 credits

DONALD C. LEAVENS

Current policies and practical problems in transportation, including the theory and technique of regulation and economic, legislative and administrative factors requiring consideration in dealing with transportation problems. Historical background of the present transportation situation. Influence of transportation facilities, services, and costs on the extent and nature of economic development of production areas and on the location of commercial centers for processing and storage operations; agricultural and non-agricultural products and rate-making; current problems of rail, truck and water competition; regulated versus unregulated motor carriers; and the effect of recent rapid increases in transportation costs on sources of supply, market areas, and consumers. Primarily, a general course in economics of transportation, with some special attention to agriculture. *Prerequisite:* A course in principles of economics and a basic course in economic theory, agricultural economics, marketing, or transportation.

5-450. Transportation Geography

(See p. 51)

COOPERATIVE EXTENSION EDUCATION

COMMITTEE

MARY L. COLLINGS (Chairman)

ROY BECK

D. BARTON DELOACH

CANNON C. HEARNE

BARNARD JOY

C. C. LANG

ALICE LINN

JOSEPH L. MATTHEWS

PAUL E. NYSTROM

Cooperative extension education consists of the off-campus, non-resident teaching service of the land-grant institutions in cooperation with the USDA and the leadership of a county. It is the largest non-school educational program in the United States. The growing interest, on the part of county agents, supervisors, specialists, and training personnel, in advanced study under the guidance of the Federal extension staff has led the Graduate School to appoint a committee on Cooperative Extension Education. This committee has the responsibility for giving guidance to students toward a program best suited to the individual's needs, within the framework of the Graduate School. This program may well lead to an advanced degree depending upon the plans of the student and the cooperative arrangements with local educational institutions and the Graduate School.

The following courses are given as the demand justifies:

7-450. Principles and Techniques of Extension Teaching

Spring, 2 credits

GLADYS GALLUP and OTHERS

This course is designed primarily for extension workers. The principles and techniques of educational methods are applied to extension work. The relative influence of teaching methods are studied from the point of view of reaching and teaching more people.

7-535. Methods of Evaluating Educational Programs

Fall, 2 credits

LAUREL K. SABROSKY and OTHERS

Clarification of objectives, data collection, sampling procedures, analysis, interpretation, presentation, and use of data. This course is especially adapted to extension programs, but principles and procedures are applicable to all voluntary educational programs. It is not the intention to make a "studies expert" of each student, but to give a broad concept of methods of systematically appraising work and programs.

7-595. Four-H Club Organization and Procedures

Fall, 2 credits

E. W. AITON and STAFF

Specially designed for county extension agents and other extension youth workers, this course stresses 4-H Club objectives, philosophy, and the principles and operational aspects of planning and conducting effective youth programs.

7-596. Development of County Programs

Spring, 2 credits

JOSEPH L. MATTHEWS

A systematic study of methods of developing voluntary county educational programs, including sources of essential basic information; the role of lay people and of supervisors, specialists, and county workers; use of planning committees; step-by-step procedures; coordinated county plans; and characteristics of good programs. Special reference will be made to Extension programs, but principles and procedures are applicable to all voluntary educational programs.

7-695. Problems in Cooperative Extension Education

Schedule to be announced. Credits to be arranged

Staff—Division of Extension Research and
Training, Federal Extension Service

An opportunity will be offered to qualified, experienced extension workers who desire to undertake a study of a problem in cooperative extension education. The amount of credit, to be determined by a committee, will be based upon the nature of the problem, amount of work, and quality of the study.

HUMAN RELATIONS**COMMITTEE**

CONRAD F. TAEUBER (Chairman)

JOHN M. BREWSTER

MARGARET J. HAGOOD

FORREST E. CLEMENTS

CARL C. TAYLOR

Courses in human relations are planned to meet the needs of four types of students: (1) those who wish a general rather than specialized knowledge of social problems and processes; (2) those who wish substantial first undergraduate courses in sociology, anthropology, and psychology; (3) those who wish specialized undergraduate and graduate courses in these same fields; and (4) mature persons who wish courses which use the knowledge of all social sciences in considering public issues and policy.

Introduction to the Study of Human Relations is designed to meet the needs of the first of these types of students. The American Tradition is representative of courses designed to meet the

needs of the fourth class of students. Most of the other courses are standard college undergraduate and graduate courses in their respective fields.

Undergraduate students who have not had general orientation in the field of sociological sciences should enroll in Introduction to the Study of Human Relations so that, during the progress of the course, they may decide which of the specialized subject matter fields they care to pursue further. Most of the first courses in specialized fields of psychology, sociology, and anthropology are so placed as to give students who take this basic course the opportunity to pursue their specialized interests in a following semester.

7-105. Introduction to the Study of Human Relations

Fall, 2 credits. Repeated in Spring and Summer

MYRON F. LEWIS

A study of the contributions of the various social sciences, but especially sociology, psychology and anthropology, to an understanding of human behavior. An integrative course for students who have not had an opportunity to study any of the sociological sciences. Designed to acquaint students with techniques and principles used in describing and analyzing human relations. Should not be taken by students academically prepared to do advanced work in this field.

7-210. General Psychology

Fall, 3 credits. Repeated in Spring

RICHARD S. FITZPATRICK

A study of the basic patterns of human behavior, instincts, habits, ideas and attitudes. The course begins with a thoroughgoing analysis of the human nervous system and concludes with an analysis of personality. A non-laboratory course.

7-215. General Sociology

Spring, 2 or 3 credits

E. GRANT YOUMANS

The purpose of the course is to orient the student to the fundamental concepts and principles in human social behavior: the role of science in understanding human behavior, geographic and biological factors in human behavior, uniformities and variations in culture, social organization and disorganization, socio-psychological dynamics in normal and abnormal personality development, race relations, social class and caste, American social institutions, social and cultural change. Lectures, class discussions, student reports, films, and field trips. A student may arrange to receive three credits for the course by completing a special project.

[7-220.] Introduction to Cultural Anthropology (1955-56 and alternate years)

Spring, 3 credits

FORREST E. CLEMENTS

7-240. Mental Hygiene

Fall, 3 credits

JOSEPH SAMLER

The formation of personality, its growth and dynamics. The relationship between mental health and self-respect. Emphasis is placed on motivational factors, conscious and unconscious, and upon personality as a function of interpersonal relationship. A term project will provide practice in observation of behavior and in attempting to understand underlying motivations.

7-255. Improving Group Work

Fall, 2 credits. Repeated in Spring

THELMA A. DREIS

A practical course in group development. Human relations in different types of groups in the family as well as other types of community groups. Conference planning, discussion methods, and effective use of consultants and resource persons. Principles of group dynamics. Special human relations problems including those problems faced by teachers responsible for training in different cultures. Although the emphasis is not on reading, some help is given through pertinent bibliography. Class limited to 15.

7-303. Child and Adolescent Psychology

Spring, 2 credits

KATHARINE P. BEARDSLEY

Study of the development of human behavior from the prenatal period through adolescence in terms of the processes of physical, mental, emotional and social growth in the individual. Particular emphasis will be given to the interactions of the child's total personality.

7-304. The Conditions of Personality Growth

Fall, 2 credits

KATHARINE P. BEARDSLEY

This course treats the principal factors influencing personality development: physiological bases, early experiences and cultural determinants. It considers both experimental and clinical contributions to the study of personality, and their application to practical problems of understanding and dealing with people.

7-317. Applied Experimental Psychology

Fall, 2 credits

ALBERT I. PRINCE, JR.

The application of psychological laws and principles to problems in training, industry, human engineering, and social groups. Experiments in the areas of learning, perception, personality testing, and motivation are analyzed and discussed. This is a non-technical course designed to acquaint the student with the contributions of the experimental approach to the study of human behavior.

7-325. Managing Personal Finances

Fall, 2 or 3 credits. Repeated in the Spring

C. M. MOUSER

The course has three main purposes: (1) to assist persons in planning the management of their finances to meet future needs; (2) to discuss principles which govern day by day financial decisions; (3) to acquaint students with the major financial instruments. Topics included are: building up of savings for such purposes as the education of children; plans for home ownership; fund for old age and retirement; renting versus owning a home; costs of home ownership; financing durable and other consumer goods; sources and costs of consumer credit and installment buying; life insurance and annuity contracts; protection versus savings; property liability and other insurance programs; planning and administration of estates; joint ownership; laws of intestacy; making a will; administration of estates as executor or administrator; proof of will, costs and fees; deeds, abstracts, mortgages, trusts, contracts, notes, stocks, bonds, debentures, and savings account; an introduction to the mathematical calculations needed in order to understand and use these instruments.

Students may arrange to receive three credits by completing a special project.

7-332. Contemporary National Cultures I—Far East

Fall, 3 credits

N. G. D. JOARDAR

Contemporary history of China, Korea, and Japan. The cultural patterns of the Far East. The differences between them and those of the United States. The problem of misunderstanding and the methods of obviating it.

7-333. Contemporary National Cultures II—Southern Asia

Spring, 3 credits

N. G. D. JOARDAR

Contemporary history of India, Pakistan, Afghanistan, Nepal, and Ceylon. The cultural patterns of Southern Asia. The differences in outlook of the people of Southern Asia and the United States. The problem of understanding.

7-400. Introduction to General Semantics

Fall, 2 credits. Repeated in Spring

J. A. SAUNDERS

General Semantics may be defined as a study of human responses to language and other symbols; the relationships between words and things and between language and human behavior. It may be considered as a synthesis of science and the formulation of the general methods of science in such a way that they may be applied by the average individual to help him solve his every problem. The great majority of people who learn to apply the principles and methods of semantics find that these facilitate communication between individuals and between groups; eliminate the common errors in thinking which practically everyone makes at times and enables them to find more appropriate solutions to many of their problems (personal, professional, economic and social) in a shorter period of time and with a less expenditure of energy.

7-433. Social Psychology

Spring, 3 credits

MYRON F. LEWIS

A general course on the social aspects of personality, social interaction and collective behavior. It includes treatments of cultural conditioning of personality, personality measurement, communication, public opinion, propaganda, censorship, mobs, riots, and social movements. An individual project is required for the third credit. *Prerequisite:* A course in general psychology or equivalent.

7-442. Personality Disorders

Spring, 2 credits (alternate years)

ALBERT C. CORNSWEET

This course through lectures and case discussion will deal with personality variations as seen among normal people, stressing the significance of such variation in social and occupational adjustment, and with major types of abnormal personalities with emphasis on recognition of these deviations. Designed to help meet the needs of placement officers, counselors and others who through interviews or other media must recognize and deal with problems of emotional maladjustment. *Prerequisite:* A course in general psychology or equivalent.

6-453. Human Relations in Administration

(See p. 62)

7-465. Basic Ideas in the American Tradition

Spring, 3 credits

JOHN M. BREWSTER

Analysis of three basic concepts in the American tradition, Freedom, the Spirit of Enterprise, and Equity, in terms of eminent statesmen and thinkers, the historical conditions of the development of each concept, and the important value conflicts in our present cultural heritage. (1) Freedom is analyzed as the equal opportunity of each (a) to the same voice in accepting or rejecting the rules (policies), which all must observe, (b) to develop and use his capacities in any social role of his choosing, and (c) within the limits of the public safety, to be a challenger of any prevailing opinion and practice. The premises on which rests this equality of opportunity are analyzed and compared with the opposite premises of the dictatorial or aristocratic outlooks. (2) Two phases, the nature, and the origin, growth and decline, of the Spirit of Enterprise are analyzed. (3) Three divergent concepts of Equity running through American thought are considered: the pre-enterprise security concept of equity which calls

for limiting income inequalities to the point where each man has at least enough income to support his customary role in life; the enterprise concept of equity according to which a man is "worth whatever his services will fetch in the market"; and the modern welfare concept of equity according to which complete equalization of incomes is required to maximize the want-satisfying power per unit of national income.

7-470. Applications in General Semantics

Year, 1 credit each semester *

J. A. SAUNDERS

Designed for advanced students of General Semantics who desire more experience in applying the principles, techniques and devices of this new discipline to the solution of personal, professional, community and national problems. Members of the group will work on problems of their own choosing. Persons who select similar problems will be organized into sub-groups. Each individual or group, by the second meeting, will be expected to have presented an outline of its project to the director for his approval. Each individual or group will be expected to prepare at least one paper or "report" for discussion and evaluation by the class. Credit will be awarded on the basis of written reports on student projects suitable for general distribution. Audit students will participate in all activities of the group but need not submit reports for general distribution. *Prerequisite:* Completion of a course in General Semantics or equivalent, or permission of the instructor.

* Students may attend both or either semesters.

[7-482.] Social Psychology of Communication (1955-56 and alternate years)

Fall, 2 credits

RICHARD S. FITZPATRICK

[7-533.] Research Methods in Human Relations (1955-56 and alternate years)

Spring, 2 credits

RICHARD S. FITZPATRICK and MELVIN A. GOLDBERG

[7-540.] Health and Medical Service Problems, Policies and Programs (1955-56 and alternate years)

Fall, 2 credits

MARGARET C. KLEM
HELEN L. JOHNSTON

HISTORY AND INTERNATIONAL RELATIONS

COMMITTEE

H. DUNCAN HALL (Chairman)

O. B. CONAWAY

STANLEY K. HORNBECK

NELSON T. JOHNSON

WALTER KOTSCHNIG

FRED J. ROSSITER

CLAYTON E. WHIPPLE

FRANCIS O. WILCOX

Courses on history and international relations have a central place in any university. This is specially true in relation to the Graduate School which serves the needs of government employees, for officials and students in Washington live and work in an international atmosphere. International facts and problems are part of their daily background. They have to be specially aware of the

subtle interplay of national and international aspects of government activities. They meet, and many of them work with, foreign officials. In addition to the need—shared with every alert citizen—to understand the main underlying factors in world politics and economies, they have a special occupational interest. They need to learn something about the ideas, assumptions and national backgrounds of foreign officials, about how foreign governments work, how things are done in foreign countries. They need to be aware of the factors that affect the policies of other countries as well as their own.

The Graduate School is making an effort to meet these special needs. Its program, which is designed to make more effective use of the unique local teaching resources in Washington as a world capital, should be especially useful to individuals likely to have personal contacts with foreign officials and businessmen and those who have to deal with problems which have international aspects, including American interests in foreign countries. The program also will be of value to those who wish to increase their understanding of foreign affairs in a general way, or in a particular field.

Arrangement of Program

While the basic courses are designed for all students, those who can follow these courses by taking more specialized courses which fit their interests and work will benefit most from the program.

The focal point of the program is the course on International Relations. International Relations is an introductory course which outlines and explores the subject and makes the student aware of its ramifications and difficulties. It is designed to give the student an awareness of the basic factors which are constantly at work in international politics. At the end of the course the participants are in a better position to decide in which directions they can most profitably specialize.

The other courses fall into several categories:

1. Historical Courses

The historical courses are designed to give students the depth of perspective which can only come from a study of history. History can answer the question: "How have we come to where we are?" In giving that answer it can help to clarify the current situation, and may throw some light on the future.

For the next two years, the following courses are included in this group: American History, European History, History of the Far East and South Asia.

2. *Courses on the Contemporary World*

These courses are designed to supply the students with information about the structure, functioning and relations of the larger groupings of powers that dominate the world in which we live. In 1954-55, one course is offered in this group, The British Commonwealth and the United States.

3. *Comparative Studies of Institutions and Ideas of Different Nations*

Comparative studies of government organization, foreign policies and national objectives, economic and foreign trade policies, and national aptitudes and educational methods are offered as advanced seminars when there is sufficient student demand. These seminars are under the direction of an expert who is assisted by American experts in these fields and by foreign attaches in Washington.

4. *American Foreign Relations and Policies*

One course in this field is offered in 1954-55, American Foreign Relations, Policies, and Practices. A second course, American Defense: Assumptions, Policies, and Problems, will be offered at a later date.

7-250. **American History to 1865**

Fall, 3 credits

WAYNE D. RASMUSSEN

A survey of the political, social, economic, and cultural forces, prior to 1865, which have contributed to the development of American civilization. Includes a summary of the colonial period; the political, economic, and diplomatic factors of the American Revolution; and the development of national life and institutions.

7-251. **American History since 1865**

Spring, 3 credits

WAYNE D. RASMUSSEN

A survey of the political, social, economic, and cultural forces which, since 1865, have contributed to the development of present-day American civilization. Includes the frontier movement and immigration; constitutional growth and changes in world relations; and economic change and development.

7-324. **International Relations**

Fall, 3 credits

H. DUNCAN HALL and H. M. SPITZER

An introductory course dealing with the permanent and basic elements in world politics. Topics include the nature, motive forces, and organization of the State system; international politics as a struggle for power; the nature, role, and limitations of national power; the balance of power; the factors of morality and law; geography, climate, fertility; the role of frontiers, dependent areas and peoples; "international frontier" areas and their phenomena; the human factors; population, culture, war in the minds of men, the role of aggression; ideology; the economic factors—raw materials, industry, technology; war defense and peace; international organization.

7-365. European History, Significant Trends and Events

Year, 3 credits each semester

H. M. SPITZER

This course covers material usually found in the college course in European History or Civilization. Its principal aim is to trace and appraise such European contributions to civilization as are significant today, especially in the field of social institutions, political organization, and psychological attitudes. The major questions which dominate world affairs today are rooted in European developments and cannot be fully understood without reference to the history of that continent.

7-436. History of the Far East and South Asia and their Relations with the West

Spring, 3 credits

NELSON TRUSLER JOHNSON

Renascence European man and Byzantine European man—their characteristics and how they discovered and reacted to the peoples of the Far East (India, China, Japan, etc.). Reactions of Oriental man to European man—trade, education, language, government. Social and governmental changes in Oriental society, e.g. in China, the problem of replacement of an ancient theocratic type of authoritarian state and the search for alternative forms; the experiment of a one-party type of dictator state. Emergence of the communist model in China and its relation to Chinese traditions. Emergence from colonial status of the new states of India, Pakistan, Ceylon, Burma, Philippines, and Indonesia.

7-454. The British Commonwealth and the United States

Spring, 3 credits

H. DUNCAN HALL

Survey and analysis of the growth, nature, structure, and working of the Commonwealth and its role as an ally of the United States. The eight member States, the older British Commonwealth, and the new Asian members (India, Pakistan, Ceylon). The effect of expansion in Asia and Africa. The Commonwealth as the West's bridge with Asia and Africa. The institutions and international machinery of the Commonwealth. Foreign and defense policies. The Commonwealth's bonds of history, constitutional structure, family, Crown, and common citizenship. The governing elements of each member State (Ministers, parliaments, law officers, civil servants, members of armed forces). Common symbols, allegiance, channels of communication, interests. Role of Commonwealth in world politics: relations with the United States, Asia, Europe and the Atlantic system, Africa, the United Nations. Economic and cultural relations.

7-474. American Foreign Relations, Policies and Practices

Fall, 3 credits

NELSON TRUSLER JOHNSON

Fundamental principles as developed in the conduct of our foreign relations from the Declaration of Independence up to the close of the free immigration period in 1925; significant subsequent developments through and following World War II, requiring us to accept and meet the responsibilities which go with our position among the nations.

United States Government organization for conducting its business with other governments. Factors which have played major roles in the development of foreign policy: commerce, international finance, shipping, fishing, agriculture, etc.; public opinion and the influence of media of mass communication; minority and pressure groups; etc. Implementation of foreign policy in peace and war, choice of people and machinery; informing other peoples about ourselves and how best to accomplish it. Need for effective coordination of our governmental machinery so as to identify and harmonize the needs and convictions of the whole American people in a united common action for the achievement of their ideals. Present methods of coordination. Other possible methods, including the Secretariat system.

Technology

DEPARTMENTAL COMMITTEE

R. G. HAINSWORTH (Chairman)

EVAN L. FLORY

HARRY F. MABBITT

ELBRIDGE C. PURDY

J. P. SCHAEZNER

E. J. STOCKING

G. C. TEWINKEL

ROBLEY WINFREY

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Various departments and agencies of the Federal Government are engaged in programs such as flood control, soil conservation, power development, mapping, and rural electrification, which involve in varying degrees engineering techniques and professional engineers. They include many functions which require a working knowledge of techniques not provided in the standard engineering courses.

Basically, education in engineering schools is limited by necessity and tradition to a period of four or five years. This short period of training provides sufficient time to assimilate and master only a minimum of the basic sciences. There is little time available for courses which will give the technical student an understanding of the social and economic problems of the world about him. As a result, he fails often to appreciate the impact upon society of the advances of his profession. Moreover, technological techniques and practices are never static and developments in the sciences and in engineering require enlarging and constant reorienting of the engineer's technical background.

The Graduate School, working with representatives of the various Government departments and agencies and of the local chapters of engineering societies, offers courses designed to add to the technical, professional, and administrative background of engineers in the service of the Federal Government. Many courses offered provide training in the latest techniques that colleges and technical institutes often cannot provide.

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ENGINEERING

COMMITTEE

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FERDINAND KAUFHOLZ

KARL O. KOHLER, JR.

E. J. PETERSON

W. D. POTTER

HARRY SAWCHUCK

F. F. SNYDER

JOHN A. WEBER

8-92. Engineering Review for P. E. Examination

Fall, non-credit

PAUL S. DELL'ARIA

A general refresher course in basic sciences and engineering principles intended to assist in preparation for the basic portions of the District of Columbia

Professional Engineer's License Examination (not specific branches of engineering). Covers elements of strength of materials, structures, fluid mechanics, mechanical engineering, electrical engineering and engineering economics. *Prerequisite*: Preferred, those qualified to take the P. E. examination.

8-110. Principles of Electricity

Spring, 2 credits

DAVID ASKEGAARD

Principles of electricity, emphasizing alternating currents. Covers basic units such as voltage, current and power and their measurement, resistance, voltage regulation, line loss, power factor, three phase systems, etc. The function of equipment used on rural electric distribution systems such as generators, substations, transformers, lightning arrestors, fuses, oil circuit reclosers, etc., will be emphasized.

8-115. Practical Electronics

Year, 3 credits each semester

ROBERT HAUPTMAN

This course aims at a practical approach to the fields of radio, television, and allied subjects. In order to enable the student with only rudimentary background to grasp the concepts, the use of mathematics is held to a bare minimum and the basic studies are undertaken in a simple descriptive manner. The first semester deals with electronics fundamentals, amplifiers, and radio receivers. Specific topics include: principles of electronics and radio; electronic components; DC and AC circuit characteristics and analysis; electron tubes; amplifiers; radio receiver fundamentals and applications. The second semester deals with radio transmitters, FM, TV, and miscellaneous subjects. Specific topics include: radio frequency generation; radio transmitter fundamentals and applications; fundamentals and applications of frequency modulation and television; propagation, radiation, and antennas; sources of power; test equipment. Text: R. L. Dawley, *Radio Handbook*.

8-402. Principles and Practice of Refrigeration

Fall, 2 credits (alternate years)

HARRY L. GARVER and PAUL JAMES

Includes a study of: types of mechanical equipment, power, controls, evaporators, condensers, insulation and heat transfer, characteristics of refrigerants and eutectic solutions; refrigeration requirements for different foods; management of storages; and refrigerated transportation. *Prerequisite*: Physics, algebra, trigonometry, and analytic geometry.

8-405. Principles of Specifications

Fall, 2 credits

BENJAMIN ROSENZWEIG

A basic course in the principles underlying the government specifications systems. A brief survey will be made of procurement documents and the purposes they serve. The organization of specifications for form, clarity, and effectiveness will be demonstrated. The evolution and ramifications of specifications will be considered with regard to research and development; legal and contractual relations; proprietary items; and government inspection. The division of specifications into performance and formulation types will be reviewed. The problems of standardization and industry coordination will be discussed. *Prerequisite*: Knowledge of procurement, inspection, research and development processes, or specification writing.

8-420. Fundamentals of Standardization

Spring, 2 credits

BENJAMIN ROSENZWEIG

A course in the basic principles underlying the concepts of standardization from the engineering and management points of view. Presents the need for rationalizing the approach to design, production, procurement, and supply. Topics included are: the transition from unorganized systems; the development

of a common terminology; the creation of a system of control data; a systematic analysis leading to a simplification of supply systems; the contribution of organized specifications to standardization; forms of engineering standardization; the concept of standardization as a management tool. *Prerequisite:* Work in specifications or standards development, procurement, supply, cataloging, or engineering.

8-465. Applied Electronic Theory

Year, 2 credits each semester

H. WALTER PRICE

General principles of electronics; basic characteristics of resistance, capacitance, and inductance taken singly and in combination; practical basic components; elementary circuit analysis particularly as it pertains to series and parallel resonance; circuits with distributed constants; generation and propagation of radio waves; fundamental principles of electron tubes including diodes, triodes, and pentodes; voltage amplification.

The second semester is a continuation and elaboration of subjects undertaken in the first semester: Class A, B and C panels amplification; rectifiers and power supplies; sine-wave oscillators; amplitude modulation and detection; frequency modulation; transmitters; receivers including the superheterodyne; basic pulse circuits; fundamentals of television; theory and use of test equipment.

This is an intermediate level course stressing how electronic circuits work. Elementary complex notation will be introduced and extensively used. *Prerequisite:* Physics, algebra, trigonometry, DC electricity, AC electricity, or consent of the instructor. A knowledge of elementary calculus is helpful but not necessary.

8-560. Fundamentals of Telephony I

Fall, 2 credits

THOMAS J. McDONOUGH

A course in the principles of outside plant design. Pole line, aerial wire, cable, protection, transposition systems and transmission improvement.

8-561. Fundamentals of Telephony II

Spring, 2 credits

THOMAS J. McDONOUGH

A course in the principles of central office equipment design. Design of major circuits, trunk circuit design, signaling and supervision, characteristics of the dial equipment of six manufacturers, traffic determinations for manual and dial systems, numbering, automatic message accounting equipment and other optional equipment and features, influence of toll dialing on central office design, latest advances in voice frequency repeaters, carrier and radio.

8-574. Rural Telephone System Design

Spring, 2 credits

THOMAS J. McDONOUGH

In this advanced course in telephony the students apply the principles discussed in Fundamentals of Telephony I and II, in the design of a complete telephone system for a specific rural area. The economy of various methods of serving the area are demonstrated. Annual charges are used in developing the most economical system. The effects of connecting company agreements and inter-toll dialing requirements are demonstrated. *Prerequisite:* Fundamentals of Telephony I and II or consent of the instructor.

8-664. Distribution Line Design

Fall, 2 credits (alternate years)

J. J. A. JESSEL and ALMON D. THOMAS

Design of the electrical and mechanical features of distribution lines and distribution systems. The course is arranged to give engineers fundamental design techniques based on operational and economic considerations. Subjects covered include: system and area characteristics; selection and spacing of conductors, poles, hardware and transformers; sectionalizing requirements; light-

ning protection; provisions for area growth. *Prerequisite:* Degree in engineering or equivalent experience.

8-665. Transmission Line Design

Spring, 2 credits (alternate years)

J. J. A. JESSEL and ALMON D. THOMAS

Determination of the electrical and mechanical characteristics of transmission lines to best fulfil the operational and economic needs of the electric power system. The course is designed to give engineers the basic technical steps to be taken in the design of transmission lines. The following subjects are covered: system requirements; route selection; topographical survey; selection and spacing of conductors, poles or towers, hardware and insulators; switching requirements and substation design; lightning protection; system stability and board studies. *Prerequisite:* Degree in engineering or equivalent experience.

[8-702.] Electric Utility Engineering (1955-56 and alternate years)

Year, 2 credits each semester

J. J. A. JESSEL and ALMON D. THOMAS

SURVEYING AND MAPPING

COMMITTEE

G. C. TEWINKEL (Chairman)

WALTER DIX
GEORGE H. EVERETT
JAMES P. FONDREN
W. S. HIGGINSON
RAY A. KELSEY

J. E. KING
GUNNAR LEIFSON
ALBERT L. NOWICKI
ROBERT H. RANDALL, JR.
LANSING G. SIMMONS

Maps have played an important part in human progress. Today, as never before, they furnish the basis for both military and non-military activities throughout the world. Greater use of maps has brought increasing demand for persons qualified in each of the technical phases of map production and reproduction.

The purpose of the curriculum in surveying and mapping is to offer basic training for those persons who are engaged in the technical and supervisory aspects of map making. The curriculum is intended to give the student a broad knowledge and basic understanding of each of the separate phases of the science; to enable him to understand better the problems, possibilities, and limitations of each of the phases. He can then better plan his own activities toward the economical production of accurate maps. A large part of the curriculum is devoted to geodesy, a subject considered to be of increasing importance in view of modern rapid means of world-wide travel, the consequent need for world-wide charts, and the development of new methods in surveying.

At least two years' work toward a degree of Bachelor of Science in Civil Engineering is considered as being the logical background for the curriculum in surveying and mapping. Many other potential students will also find that they may have already fulfilled all

or nearly all the prerequisite studies. It should be emphasized that Calculus and College Physics are desirable prerequisites for advanced courses. Persons who are planning a career in this field are urged to arrange their schedules so as to include these courses at the earliest opportunity.

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Surveying

[8-135.] Elementary Surveying (1956-57 and every third year)

Fall, 3 credits

ERNEST J. PARKIN

[8-204.] Ground Methods of Topographic Surveying (1956-57 and every third year)

Spring, 3 credits

ERNEST J. PARKIN

8-215. Route Surveying

Fall, 3 credits (every third year)

ERNEST J. PARKIN

Theory and practice of surveying for railroads, highways, canals; preliminary and location surveys, cross sections, earthwork quantities and transition spirals. Lectures, classroom work and field work. *Prerequisite:* Elementary surveying and plane trigonometry.

8-217. Astronomy for Engineers

Spring, 3 credits (every third year)

ERNEST J. PARKIN

The fundamentals of the circular systems; basis of the determination of time, longitude, latitude and azimuth; the use of instrumental equipment such as altazimuth instrument, zenith telescope, meridian transit, sextant, astrolabe, zenith camera. Lectures, classroom work and field work. *Prerequisite:* Ground Methods of Topographic Surveying or equivalent or permission of the instructor.

[8-218.] Geodetic Surveying (1955-56 and every third year)

Fall, 3 credits

ERNEST J. PARKIN

[8-219.] Computation and Adjustment of Geodetic Observations (1955-56 and every third year)

Spring, 3 credits

ERNEST J. PARKIN

[8-440.] Theory of Geodesy (1955-56 and alternate years)

Year, 3 credits each semester

Instructor to be announced

Photogrammetry

8-120. Introduction to Photogrammetry

Fall, 2 credits

RAY A. KELSEY

Lectures and demonstrations in non-technical terms cover: the history and development of photogrammetric engineering; the importance of optics; basic principles of photography; types of aerial photography, aerial cameras, accessory equipment, and photographic aircraft; requirements of coverage, flight lines, tilt, and scale; photo interpretation and stereoscopes; requirements of horizontal and vertical control; radial plot and stereoscopic plotting instruments. Designed for

persons who use aerial photographs in military planning and operations, highway development, agricultural land use and conservation, mineral and petroleum exploration, and in other engineering and industrial operations.

8-208. Aerial Photographic Interpretation

Fall, 3 credits

ETHAN D. CHURCHILL

Principles, techniques and applications of aerial photographic interpretation; history, concepts, types of aerial photographs, principles, techniques, and applications. Study, and use in various fields, of aerial photographs as a source of detailed natural and cultural information. *Prerequisite:* A general background in one of the following fields: surveying and mapping, cartography, geography, geology, forestry, agriculture, architecture, or allied engineering fields.

8-212. Photogrammetry I

Fall, 2 credits

W. S. HIGGINSON and G. C. TEWINKEL

Basic optics; basic geometric characteristics of aerial photographs; aerial cameras; camera mounts; basic photography and laboratory practices; photographic materials. *Prerequisite:* College plane trigonometry.

8-213. Photogrammetry II

Spring, 2 credits

W. S. HIGGINSON and G. C. TEWINKEL

Flight planning; aerial photographic specifications; radial line plotting methods; mosaics; determination of elevations from photographs; photo-interpretation. *Prerequisite:* College plane trigonometry.

8-370. Photogrammetry III

Fall, 2 credits (alternate years)

G. C. TEWINKEL and W. S. HIGGINSON

Geometry of the tilted photograph, the oblique, and the horizontal; introduction to tilt determination and analytic computations; study of multiplex equipment including projectors, support bars, electric circuits, tracing table; theory of multiplex, including interior and exterior orientation; multiplex practice. *Prerequisite:* Photogrammetry I and II.

8-371. Photogrammetry IV

Spring, 2 credits (alternate years)

G. C. TEWINKEL and W. S. HIGGINSON

Stereoscopic plotting instruments; rectification; the use of horizontal and oblique photographs; the photo alidade; continuation of multiplex theory and operational practice, including map control (horizontal, vertical and extension), planimetry and contours. *Prerequisite:* Photogrammetry III.

[8-408.] Advanced Aerial Photographic Interpretation (1955-56 and alternate years)

Spring, 3 credits

ETHAN D. CHURCHILL and SPECIALISTS

Cartography

8-125. Introduction to Cartography

Spring, 2 credits

EDWIN H. SERVESON

The purpose of this course is to introduce the student to the broad field of cartography. This includes general instruction in the history of maps; the shape of the earth; the fundamental concepts of the most common projections; the basic principles of surveying, topography, hydrography, photogrammetry, oceanography and sketch mapping; the classification, evaluation, compilation, con-

struction and revision of maps and charts; and the methods and techniques of reproduction. See also course 5-114, Maps and Charts, in the Department of Physical Sciences.

8-222. Cartography I—Technical Elements

Fall, 2 credits

GEORGE H. EVERETT

Course introduces the student to the use of geodetic principles in solving problems of geographic position and the application of these principles in map compilation problems. It includes a study of Clarkes Spheroid, coordinate systems for expressing relative location, plotting and the scale problem of maps, control and orientation problems, map datums, graphic methods of determining location and orientation, use of the position formula, curvature of the parallels, principles of locating plane coordinate positions on a geographic projection. *Prerequisite:* College plane trigonometry.

8-223. Cartography II—Map Projections and Grid Systems

Spring, 2 credits

EDWARD W. FONFARA

Includes: basic principles with practical applications; computations; use of tables; layout; definitions; classifications; and characteristics. Identification of such standard projections as the polyconic, mercator, transverse mercator, Lambert conformal, gnomonic, and stereographic; and coordinate systems including rectangular, broad-area and true military grid.

This subject is presented from the practical viewpoint without the complex variable theory applications. *Prerequisite:* College plane and spherical trigonometry.

8-224. Cartography III—Large Scale Maps

Fall, 2 credits (alternate years)

JACOB SKOP

Includes a review of the fundamental principles of cartography and the application of these principles with emphasis on large scale maps. Specific topics include: types and scales of maps; classification of the earth's features and their interpretation in symbolization; names; drainage, relief, woodland and vegetation, and other cultural features; foreshore and offshore hydrography; public land surveys; methods and procedures for making large scale maps; pre-compilation preparation; aerial photography; horizontal and vertical control; classification surveys; the compiler and his work; compilation; editing and field checking; color separation drafting; photolithographic reproduction; and military grids. *Prerequisite:* Cartography I and II or equivalent.

8-225. Cartography IV—Small Scale Maps

Spring, 2 credits (alternate years)

Instructor to be announced

Factors to be considered in selecting the projection for the map, the scale, and the material for the compilation; drawing the map and preparing it for reproduction; compilation, reproduction, and use of the Army Map Service series of maps: the Nautical Chart Series including their compilation, reproduction and application to navigation; the Aeronautical Chart Series including their compilation, reproduction, and application to air navigation. *Prerequisite:* Cartography I and II or equivalent.

8-240. Methods of Map Reproduction

Spring, 2 credits

M. S. A. DELANEY and SPECIALISTS

Designed for persons engaged in the various phases of surveying and mapping. Covers modern media used in the preparation of the original and the original map copy itself for reproduction; the requirements of a good map/chart original; the advantages and disadvantages of photolithography, letter press, and gravure, including ozalid and photo-gelatin; color separation originals, negatives,

and printing plates; combining half tones with the contour system. Provides the student with a broad working knowledge of the many steps involved in duplicating the map/chart original in black and white and multicolor work. Economy and precision in map-making is predicated on a knowledge of the process selected for reproduction.

8-430. Theory of Map Projections

Fall, 3 credits (alternate years)

Instructor to be announced

Introduction to the mathematical techniques in the development of map projections. The elements of the complex variable, vector analysis and tensor analysis are developed as needed. The mathematical background of the class determines the time devoted to mathematical preliminaries. *Prerequisite:* Calculus, Cartography I or II, or experience as determined by the instructor.

FINE AND APPLIED ARTS

COMMITTEE

HARRY F. MABBITT (Chairman)

SADYE F. ADELSON
MARTHA L. HENSLEY
O. A. DE LA ROSA
ROWLAND LYON

HENRY A. MAGNUSON
BEVERLEY ROBINSON
N. P. STATHIS
LEO G. WIEMER

Fine Arts

8-60. Pencil Sketching and Water Color Painting

Summer, non-credit

ROWLAND LYON

An informal class in theory and practice. Student may use either or both media. Class meets out-of-doors whenever possible.

8-320. Water Color Painting

Fall, 2 credits. Repeated in Spring

ROWLAND LYON

Theory and practice; painting from landscape and still life.

8-321. Pencil Sketching—Life Drawing

Fall, 2 credits. Repeated in Spring

DUANE A. MCKENNA

A progressive course of study and practice designed to give the student a thorough working knowledge of the human figure. Emphasis on personal observation and experience so the student may express a full understanding of the essential properties of motion, structure, and form. Drawing from the model and outdoor sketching included. Open to both beginners and advanced students.

8-323. Portrait Painting in Oil

Fall, 2 credits. Repeated in Spring

PIETRO LAZZARI

To enjoy this course the student need not have experience as an artist but must have the desire to achieve proficiency in portraiture.

Professional methods of painting oil portraits incorporating the basic techniques of the old masters and the spirit of modern art. Course includes, sketching, line composition and light arrangement; color, theory and technique of painting in oil. All work done from life.

8-331. Sculpture

Fall, 2 credits. Repeated in Spring

LILLI GETTINGER

A course of individual instruction for beginners and experienced students. Modeling with clay, wood, and plastics. The class meets in instructor's studio.

8-333. Survey of Art

Fall, 2 credits

CHARLES M. RICHARDS

The course is designed to establish the basic values which underlie artistic achievement and to develop an appreciation of these values before the objects themselves. From age to age these basic values—the aesthetic values—remain the same. The lectures will attempt to relate the major epochs to one another so as to indicate the continuity of art history and at the same time contrast the variant forces and ideas which produced such differing styles and expressions.

8-334. Modern Painters

Spring, 2 credits

CHARLES M. RICHARDS

This course begins with a study of the art of the outstanding masters of the 17th Century and of the general current of painting in that century, with emphasis on the development of painting through the National Schools and styles up to the present moment. The main concern will be to arrive at an understanding and appreciation of impressionism and post-impressionism.

*Applied Arts***8-55. Introduction to Interior Decoration**

Fall, non-credit. Repeated in Spring

MARTHA L. HENSLEY

A non-credit course designed for persons who wish a non-professional knowledge of the principles of color and design to help them with their home-decorating problems. Topics discussed include discovering and using design, elements and principles of design, color and color systems.

8-65. Modern Homemaking for Employed Men and Women

Spring, non-credit

LYDIA A. LYNDE and AVIS M. WOOLRICH

Up-to-the-minute practical information on home management and family relationships is given by specialists in a series of popular lectures, each followed by a question-and-answer period. The course is designed primarily for married and engaged couples, but is open to others. Registration for one head of the family will include the other. Attendance of both is encouraged.

The course will be developed around the interests of members to cover such topics as: family financial planning; menu planning; buying food; selecting the home; functional house planning; selecting and arranging home furnishings; selecting and storing household equipment; managing the work in the home; selecting clothing to suit pocketbook, wearer, and function; care of clothing; family cooperation; and child guidance.

8-188. Glass Blowing

Year, 2 credits each semester

L. B. CLARK, SR.

L. B. CLARK, JR.

A laboratory course for technicians. Simple manipulation of joining, bending, and shaping is carried through to the production of useful apparatus. Metal in glass and glass to metal seals of all types are made. During the first semester the soft glasses are utilized for practice; during the second semester the related glasses are used. Ample opportunity for advanced work is given those who show themselves particularly adapted to the work. (New students may be admitted in the Spring if space permits.)

8-281. Plant Propagation

Summer, 2 credits

L. J. ENRIGHT

Studies of the basic principles of plant propagation by seed, cutting, layerage and graftage; the practices employed by growers and plant propagators both in the United States and abroad.

8-282. Plants for the Home Grounds

Fall, 2 credits

L. J. ENRIGHT

The identification, arrangement and planting of plants adaptable to home properties.

8-283. Care of Ornamental Trees, Shrubs and Lawns

Spring, 2 credits

L. J. ENRIGHT

A study of the principles and practices relating to site, planting, care and maintenance of ornamental trees and shrubs; care and maintenance of lawns and gardens.

8-284. Principles of Landscape Design—Small Property

Fall, 2 credits

L. J. ENRIGHT

An introduction to the fundamentals of landscape design with particular emphasis upon the design of small properties. Includes principles of orientation, arrangement and circulation.

8-285. Advanced Landscape Design

Spring, 2 credits

L. J. ENRIGHT

A continuation of Principles of Landscape Design involving more complex problems. Emphasizes the development of specific sites commonly encountered in urban and suburban developments. Includes drawing, model making, conferences and criticisms.

8-415. Food Cost Control

Fall, 2 credits (alternate years)

Instructor to be announced

Consideration of the basic problems of food cost control including recipe standardization, portion control, daily food cost control, storeroom and purchasing records, equipment records, and labor costs. Students have opportunity to present situations peculiar to their own food service for group discussion. One hour lecture and two hours laboratory work on problems of food cost control. *Prerequisite:* Completion of courses in food purchasing for group feeding, quantity cookery, and institution administration or institution management; or their equivalent in practical experience, as approved by instructor.

PHOTOGRAPHY

COMMITTEE

ELBRIDGE C. PURDY (Chairman)

JAMES A. BEALES
EDWARD S. COBB
RAYMOND DAVIS
WILLIAM J. FORSYTHE

FRED W. GERRETSON
R. J. LEFEBVRE
KEITH B. LEWIS
ALBERT R. MATERAZZI

HOWLAND PIKE

8-70. Popular Photography

Fall, non-credit. Repeated in Spring and Summer

WILLIAM C. MCHENRY

This is a lecture, demonstration course of a non-technical nature. It is intended particularly for those camera enthusiasts who desire a clearer understanding of how their cameras, films and prints work. Better pictures should be the result of taking this course. Topics covered: camera types and operation; film types and uses; developing and printing; filters; exposure; planning, composition

and lighting; portraiture; motion pictures; color photography. Exhibition and demonstration of equipment, materials and techniques supplement class lectures and discussion.

8-161. Theory of Lithography I—Camera

Fall, 2 credits. Repeated in Spring

RICHARD C. BALL

Basic information on the principles of lithography and operational procedures. Functions of equipment and explanation of the purpose or use of materials involved in camera work. Function of process cameras and lenses; purpose and uses of various films and darkroom processes; familiarization with fine-line requirements; function and purpose of color filters; halftone principles—optical screens; halftone principles—contact screens; outline of four-color process; purpose of dot-etching, masking, surprints, lateral reversal, etc. *Prerequisite:* One year's experience in a lithographic plant; or Fundamentals of Photography I; or the equivalent, subject to the approval of the instructor.

8-162. Practice of Lithography—Camera

Fall, 2 credits. Repeated in Spring

RICHARD C. BALL

Demonstration and practice with lithographic equipment, and use of the darkroom and materials for experimental line and halftone photography to supplement the knowledge of subjects discussed in Theory of Lithography. Includes familiarization with the operation of the lithographic camera; techniques of darkroom processing; image control; fine-line work; use of color filters and panchromatic film; stripping film; halftone control with optical screens; halftone control with contact screens; tone-control and dot-etching; masking and screening; four-color process separations. *Prerequisite:* Theory of Lithography I, or the two courses may be taken concurrently.

8-163. Theory of Lithography II

Fall, 3 credits. Repeated in Spring

JOSEPH F. HAMM

Continuation of Theory of Lithography I, providing advanced and refined study in the field of lithography. Preparation of art and copy; planning and layout; negative engraving and stripping; blueline method for color separation; imposition and register; vinyl plastics in lithography; color proofs on vinyl; chemistry of plate-making; comparison of various plate-making processes; plate-making techniques; formulas and procedures; offset papers and their uses; composition and application of offset inks and compounds; introduction to presswork; finishing procedures and equipment; latest techniques and materials in lithography; lithographic plant management. *Prerequisite:* Theory of Lithography I, or experience in a lithographic plant. May be taken concurrently with Theory of Lithography I.

8-192. Fundamentals of Photography I

Fall, 2 credits. Repeated in Spring

EDWARD S. COBB

Forms a foundation for all of the more advanced courses in photography. Topics covered: nature of the photographic process; light as applied to photography; factors in development; developing solutions; exposure; lenses and image formation; photographic light and lighting; fixing and washing processes; and principles and use of filters.

8-193. Practice of Photography I

Fall, 2 credits. Repeated in Spring

JAMES A. BEALES

This course furnishes laboratory practice and demonstration of the principles taught in Fundamentals of Photography I. It offers the student an opportunity to become familiar with recommended procedures and techniques. Topics covered: contact printing and processing; selection of printing papers; processing of

negative roll film, cut film and film pack; diagnosis and remedy of processing defects; types of cameras, their operation and uses, and the application of filters. *Prerequisite:* Fundamentals of Photography I, or taken concurrently with Fundamentals of Photography I.

8-194. Salon Technique, Art and Composition

Fall, 2 credits

RICHARD C. BALL

Analysis and demonstration of the various pictorial elements necessary to successful picture making. Training the student to recognize and use such factors as mass, line, form, space, tone, perspective, and design to serve the picture purpose. How to dramatize the subject. Developing creative imagination.

8-195. Fundamentals of Photography II

Fall, 2 credits. Repeated in Spring

JOSEPH A. SCHANTZ

Subjects included: practical sensitometry and gradation control; the theory of projection printing; the nature of photographic light, its characteristics, control and measurement; shutter types and their performance; chemistry of photographic processes and the use of color film. *Prerequisite:* Fundamentals of Photography I.

8-196. Practice of Photography II

Fall, 2 credits. Repeated in Spring

JAMES A. BEALES

Subjects included: application of sensitometric measurements, projection printing, print correction, composite printing, lighting, rendition of form and texture, light patterns, the effect of light on color, toning and print quality analysis. *Prerequisite:* Fundamentals of Photography I, Practice of Photography I, and Fundamentals of Photography II. May be taken concurrently with Fundamentals II.

8-197. Pictorial Photography—Special Techniques

Spring, 2 credits

RICHARD C. BALL

A workshop class with the students participating. Use of special printing papers and special processing for unique effects. Making and using texture screens. Formulas and procedure for toning prints in various colors. Solarization and bas-relief printing. Making and using paper negatives. The tone-separation process, its uses and simplified procedure. How to make photograms, carbro prints, and carbon transfers. Complete procedural phases of the Flexichrome process.

8-270. Color Photography I—Camera Techniques

Fall, 3 credits

ALDO A. CARANO

Covers the general camera techniques of color photography and the use of current materials and equipment. Instruction in lighting, exposure, color balance and processing of monopack materials such as Kodachrome and Ektachrome. Lectures and supervised studio and laboratory demonstrations. *Prerequisite:* Fundamentals of Photography II and Practice of Photography II, or consent of instructor.

8-271. Color Photography II—Camera and Printing Techniques

Spring, 3 credits

ALDO A. CARANO

The making of still and table top color pictures from the start to the finished picture, with demonstrations and practice in lighting and the use of a view camera.

The printing is designed to cover in detail the use of the color Printon method. Instruction and laboratory work in the characteristics and processing of Printon: masking techniques; and color balance control. Lectures and supervised laboratory work along with "shooting" 4 × 5 color transparencies. *Prerequisite:* Fundamentals of Photography II and Practice of Photography II, or consent of instructor.

8-360. Portrait Photography

Year, 2 credits each semester

ELBRIDGE C. PURDY

A studio and darkroom course that provides opportunity for practice. The student learns through individual guidance the subtleties of fine portrait work. Lighting, posing, composition, processing and re-touching. *Prerequisite:* Practice of Photography II.

8-011. Photographic Roundtable

Year, non-credit

ELBRIDGE C. PURDY, Advisor

The Roundtable has been formed to provide opportunity for the continued study of photography. The group meets twice each month during the regular school year. One meeting is devoted to constructive analysis of photographic work presented by members; the other meeting is devoted to presentation of information about new developments and techniques in photography and to other topics of current interest. The Roundtable sponsors an Annual Salon.

Registration is open to persons who have completed any of the courses in photography offered by the Graduate School. Registration is required, and there is a small registration fee.

Correspondence Program

COMMITTEE

E. J. PETERSON (Chairman)

ROBERT E. ADCKOCK
LOUISE O. BERCAW
MARY L. COLLINGS
C. EDWIN DAVIS
WILLIAM A. DeVAUGHAN
E. R. DRAHEIM

HANS S. HOIBERG
JAMES L. ROBINSON
JAMES H. STARKEY
MERRILL M. TAYLOR
GALEN YATES
GEORGE YOUNG

The following courses are open to qualified field employees of the Federal Government and to others as facilities permit. Persons who wish further information or who wish to register in one of the courses should write to the Registrar, U. S. Department of Agriculture Graduate School, Washington 25, D. C.

125C. Basic Lettering

1 credit (7 lessons)

EUGENE MAY

Designed to familiarize the student with the fundamentals of lettering with applications to soil survey charts and maps. Topics covered are basic strokes, spacing, use of the contour pen, and lettering of symbols on aerial photographs. *Cost*: \$9 plus \$5 supplies and postage fee (does not include lettering tools).

236C. Report Writing

2 credits (15 lessons)

JAMES PICKENS

A practical course designed to aid members of the field forces in preparing memoranda and reports to administrative heads. The fundamentals of English composition are briefly and simply treated, and special attention is given to clear, concise, orderly, informative presentation and to avoiding the more common faults of expression. *Cost*: \$18 plus \$5 supplies and postage fee, plus the text.

316C. Soils and Soil Management

2 credits (15 lessons)

J. GORDON STEELE

Practical aspects of soil management. Physical, chemical, and biological properties of soils. How soils are formed. Soils of different places. How soils are changed by erosion, depletion, and improvement. Management of soils for good production and for their conservation and improvement. *Prerequisite*: Chemistry equivalent to that covered in high school. Students who lack a background of at least high-school chemistry should expect to do extra reading. Preparation in physics is helpful but not essential. *Cost*: \$18 plus \$5 supplies and postage fee, plus text.

321C. Farm Forestry

2 credits (15 lessons)

JOHN F. PRESTON

A course in the growing of wood as a farm crop. Principles of forestry as integrated with the farm business, and as contrasted with commercial forestry. The management of woods on the farm; development of a farm woodland enterprise. Designed to assist those who teach agriculture or assist farmers in its practice, professional foresters, and farmers to apply forestry techniques to the special problems of growing wood as a farm crop. Students should have access to a farm woodlot since some of the lessons require actual observation. *Cost*: \$18 plus \$5 supplies and postage fee, plus text.

414C. Federal Personnel Procedure

2 credits (16 lessons)

VERNA C. MOHAGEN

A course in basic practices and procedures designed to accomplish appointment, transfer, promotion, demotion, separation, and retirement of Federal employees. The course has three objectives: (1) to keep abreast of current developments in personnel procedures; (2) to become familiar with the legal and administrative background of such procedures (statutes, executive orders, decisions of the Comptroller General, the Civil Service Commission, Administrative Orders, etc.); and (3) to visualize the constant need for streamlining procedures in the interests of simplicity and efficiency. *Cost:* \$18 plus \$7.50 supplies and postage fee.

513C. Statistical Methods in Biology and Agriculture

2 credits (15 lessons)

JACOB LIEBERMAN and ASSOCIATES

This course uses Snedecor's textbook "Statistical Methods," and follows its outline largely but not absolutely. Each of the 15 lessons consists of narrative material, textbook assignments, questions, and problems. The reports are returned with corrections and comments. Subjects discussed include simple variation, regression and correlation, analysis of variance and covariance, chi-square, multiple and curvilinear correlation, applications to sampling and experimental design. Practical application of methods is kept to the front. Facility in the use of arithmetic and simple algebra is necessary. *Cost:* \$20 plus \$5 supplies and postage fee, plus text.

521C. Sampling and Experimental Design

2 credits (16 lessons)

F. M. WADLEY

Students enrolling in this course should have a genuine practical interest in experimentation, and some facility in statistical calculations, including analysis of variance as shown by texts like Snedecor's or Goulden's. The course is intended to give the student an introduction to basic concepts, some practice in applying them, and some acquaintance with the literature opening the way to further study. The philosophy and fundamentals are first treated, with some attention to elementary sampling principles. Next are presented lessons on simpler practical designs, as to use and analysis of results. Last come lessons on factorial design, confounding and more complex experiments, including incomplete block designs. "Experimental Designs," by Cochran and Cox, is used as a text, with some supplementary discussion. *Cost:* \$20 plus \$5 supplies and postage fee, plus text.

533C. Hydrology I

3 credits (16 lessons)

MAX KOHLER and ASSOCIATES

Review of elementary hydraulic principles basic to a study of flow in natural channels. The phenomena of meteorology which control climate. Methods of collecting data essential to hydrology. The physical characteristics of the land which control the disposition and movement of the earth's water. *Prerequisite:* Physics and algebra. Elementary meteorology, statistics, and engineering are desirable, but not required. *Cost:* \$25 plus \$5 supplies and postage fee, plus text.

534C. Hydrology II

3 credits (16 lessons)

MAX A. KOHLER and ASSOCIATES

The tools used by the hydrologist and the application of these tools to specific problems. Hydrograph analysis, runoff relations, runoff distribution, waves, streamflow routing. Special techniques required in the design of projects. Design and operation of water control works. Small basin problems. River forecasting. *Prerequisite:* Hydrology I or an equivalent course. *Cost:* \$25 plus \$5 supplies and postage fee. Text used in Hydrology I is used also in this course.

580C. Social and Economic History of Agriculture

2 credits (15 lessons)

WAYNE D. RASMUSSEN

Introduction; the geographical basis; indigenous and foreign contributions; agrarian colonization and settlement; land policies; agricultural development by periods, regions, and commodities; farm implements and machinery; labor; tenancy; financing farming operations; transportation and marketing of agricultural products; migration of industries from farm to factory; farmers political movements; agencies promoting agriculture, including individual leadership, societies, fairs, periodicals, State and Federal departments, education, and sciences; agriculture in the life of the Nation. *Cost:* \$20 plus \$9 supplies and postage fee.

662C. Federal Meat Inspection and Animal Quarantine Laws

2 credits (16 lessons)

LOWELL MILLER

A study of the history, constitutionality, and provisions of the Federal Meat Inspection Act and related legislation, and the Animal Quarantine statutes, with particular reference to the law of search and seizure, affidavits, hearsay and other rules of evidence. The course is intended as an aid to administrative officials. No previous legal training is required. *Cost:* \$18 and \$6 supplies and postage fee.

663C. Legal Aspects of Investigations—Criminal Evidence and Procedure

2 credits (16 lessons)

JAMES D. FORBES

Designed to provide investigative personnel and those desiring to prepare for such work, a background and insight into the legal aspects of their investigations: what types of evidence to seek; circumstances and conditions under which the evidence is to be obtained in order to have adequate probative value; and how to prepare such evidence for presentation in court or other procedure. Since all investigations are potential sources of prosecution, the requirements of criminal evidence and procedure often reach into the early stages of investigation. The instruction is designed to provide understandable information without overemphasis of technical aspects. *Prerequisite:* Experience in some type of investigative work. *Cost:* \$20 plus \$7 supplies and postage fee.

Faculty

FACULTY, DEPARTMENTAL AND SPECIAL COMMITTEES

The year following the name represents the first year of association with the Graduate School.

- ABRAHAMSEN, MARTIN A., (1950). Ph.D., Wisconsin. Director, Purchasing Division, Farmer Cooperative Service, USDA. Taught at West Virginia and North Carolina State College of Agriculture and Engineering. (Social Sciences)
- ACKERMAN, CLARA B., (1950). M.A., George Washington. Editor, Extension Service Review, Federal Extension Service, USDA. (Committee on Information)
- ADCOCK, ROBERT E., (1949). M.S., Oklahoma A. and M. Chief, Foreign Reporting Branch, Foreign Agricultural Service, USDA. Taught at Oklahoma A. and M. and Cameron State Agricultural College. (Committee on Correspondence Study and Extension Education)
- ADELSON, SADYE F., (1949). M.A., California. Nutrition Analyst, Human Nutrition Research Branch, Agricultural Research Service, USDA. (Technology)
- AITON, EDWARD W., (1953). M.S., Minnesota. Director, Four-H Club and YMW Programs, Federal Extension Service, USDA. (Social Sciences)
- ALLIN, BUSHROD W., (1939). Ph.D., Wisconsin. Chairman, Outlook and Situation Board, Agricultural Marketing Service, USDA. Taught at Wisconsin. (Social Sciences)
- APPLEMAN, PAUL L., (1946). Examiner in Accounting, Examining and Placement Division, Civil Service Commission. (Public Administration)
- ARNOLD, OLGA MOORE, (1954). B.A., Wyoming. Information Specialist, U. S. Information Agency. (Languages and Literature)
- ARNOULD, JACK C., (1948). LL.M., Université de Paris. Former Assistant to the Air Attaché, French Embassy. Taught at Georgetown. (Languages and Literature)
- ASKEGAARD, DAVID, (1950). B.S., North Dakota. Head, Operations Section 8, Southwest Area, Rural Electrification Administration, USDA. (Technology)
- AYLESWORTH, PHILLIP F., (1949). M.S., Purdue. Assistant to the Assistant Secretary for States Relations, Office of the Secretary, USDA. (Social Sciences)
- BACHMAN, KENNETH L., (1950). Ph.D., Harvard. Acting Head, Farm Management and Cost Section, Production Economics Research Branch, Agricultural Research Service, USDA. (Social Sciences)
- BAHN, CATHERINE I., (1953). M.A., Columbia. Geographer, Aeronautical Chart and Information Service, Department of the Air Force. Taught at Columbia. (Technology)
- BAKER, GLADYS L., (1945). Ph.D., Chicago. Agricultural Historian, Agricultural Marketing Service, USDA. (Public Administration)
- BALDAUF, TONY M., (1951). Head, Procurement Management Section, Office of Budget and Finance, USDA. (Office Techniques)
- BALL, RICHARD C., (1950). Photo-lithographer Supervisor, Office of Plant and Operations, USDA. Formerly Dean of Instruction, Photo-Tech Institute, Salt Lake City. (Technology)
- BAMFORD, RONALD, (1949). Ph.D., Columbia. Dean of Graduate School, University of Maryland. (Biological Sciences)
- BARGIN, GERMAINE, (1954). Professorat, Université de Paris. Lecturer in French, Catholic University. (Languages and Literature)
- BARNES, CARLETON P., (1954). Ph.D., Clark. Research Coordinator, Agricultural Research Service, USDA. (Physical Sciences)
- BARTLETT, L. GEORGE, (1947). C.P.A., B.C.S., Southeastern. Reviewing Examiner, Examination Division, Farm Credit Administration. (Committee on Internal Audit)
- BAUER, MAGNA E., (1943). Auguste Victoria Lyzeum, Berlin. Chief of Research Section, Foreign Studies Branch, Office of the Chief of Military History, Department of the Army. (Languages and Literature)
- BEALES, JAMES A. (1948). Chief, Photographic Section, Facilities Branch, U. S. Information Agency. (Technology)
- BEAR, N. ROBERT, (1948). B.S., Ohio State. Chief, Division of Organization and Personnel Management, Office of Personnel, USDA. Taught at Ohio State and Michigan State. (Public Administration)
- BEARDSLEY, KATHERINE PEASE, (1953). Ph.D., Columbia. Lecturer, American University. Department of Psychology, Mount Vernon Junior College. Taught at Briarcliff Junior College, Finch Junior College, and Columbia. (Social Sciences)
- BEAUCHAMP, GEORGE E., (1944). Ph.D., Northwestern. Educational Consultant, Veterans Administration. Taught at Manchester College, Northwestern, and Nottingham. (Languages and Literature)
- BECK, ROY S., (1953). Ph.D., Cornell. Extension Economist, Division of Agricultural Economics, Federal Extension Service, USDA. (Social Sciences)
- BECKNELL, HARVEY E., (1949). M.A., Columbia. Chief, Division of Training and Utilization, Office of Personnel Administration, Department of Labor. (Public Administration)
- BELL, E. DONALD, (1951). Office of Assistant Vice-President for Personnel, Southern Railway System. (Office Techniques)

- BENNEWITZ, ECKHARD, (1952). A.B., Cincinnati. Budget Examiner, Bureau of the Budget. Taught at George Washington and American. (Public Administration)
- BENTON, MILDRED C., (1950). A.B., George Washington. Librarian, Naval Research Laboratory. (Public Administration)
- BERCAW, LOUISE O., (1949). Assistant Director of the Library, USDA. (Committee on Correspondence Study and Extension Education)
- BIERMAN, RUSSELL W., (1953). Ph.D., Harvard. Agricultural Economist, Agricultural Research Service, USDA. (Social Sciences)
- BLICKENSDEFFER, J. P., (1949). Ph.D., Harvard. Editor, U. S. Quarterly Book Review, Library of Congress. Taught at Oklahoma, Washington, Harvard, and Pittsburgh. (Languages and Literature)
- BOGGS, S. W., (1948). D.Sc., Berea College. Special Adviser on Geography, Department of State. (Physical Sciences)
- BOLLO, LOUISE E., (1952). A.B., George Washington. Nosologist, Public Health Service, Department of Health, Education and Welfare. (Biological Sciences)
- BOTTS, RALPH R., (1946). B.S., Florida. Agricultural Economist, Production Economics Research Branch, Agricultural Research Service, USDA. (Office Techniques; Public Administration; Social Sciences)
- BRASFIELD, KARNEY A., (1952). C.P.A., B.S., Washington University in St. Louis. Associate Director, Accounting Systems Division, General Accounting Office. (Public Administration)
- BREWSTER, JOHN M., (1949). Ph.D., Columbia. Agricultural Economist, Agricultural Marketing Service, USDA. Taught at Columbia. (Social Sciences)
- BRIGHAM, GORDON D., (1954). M.A., Western Reserve. Captain, USAF, Directorate of Legislative Liaison. Taught at Maryland, American, and Pennsylvania State. (Languages and Literature)
- BROWN, DAVID S., (1946). A.B., Maine. Consultant in Public Administration. Taught at Syracuse. (Public Administration)
- BUCKLEY, JAMES L., (1941). LL.B., Georgetown. Assistant Director of Personnel, USDA. (Public Administration)
- BURROUGHS, ROY J., (1947). Ph.D., Michigan. International Housing Finance Adviser, Housing and Home Finance Agency. Taught at Michigan, Port Huron Junior College, and Michigan State. (Social Sciences)
- BURROWS, GLENN L., (1952). M.A., Michigan State. Statistical Consultant, Agricultural Marketing Service, USDA. Taught at Wayne, William and Mary, and Michigan State. (Mathematics and Statistics)
- BUTLER, FRANCES A., (1952). Director of Business and Secretarial School, Emerson Institute. Taught at Temple Secretarial School. (Office Techniques)
- BUTLER, K. A., (1949). B.S., Minnesota. Director of Program Appraisal and Internal Audit, Agricultural Research Service, USDA. (Public Administration)
- CALLAN, J. A. C., (1949). M.A., Union College. Research Engineer, Engineering Research and Development Laboratories, Civil Engineering Department, Department of the Army. Taught at Union College and Alabama Polytechnic. (Technology)
- CANNON, EDWARD W., (1948). Ph.D., Johns Hopkins. Principal Investigator, Logistics Research Project, George Washington University. Taught at Johns Hopkins, Delaware, and American. (Mathematics and Statistics)
- CARANO, ALDO A., (1953). Color Photographer, Office of Information, USDA. (Technology)
- CARLIN, ALBERT V., (1951). B.S., Boston. Chief of Training, U. S. Weather Bureau, Department of Commerce. (Physical Sciences)
- CARLSON, THEODORA E., (1952). A.B., Nebraska. Economic Editor, Foreign Agricultural Service, USDA. (Committee on Publications)
- CAVIN, JAMES P., (1938). Ph.D., Harvard. Office of Statistical Standards, Bureau of the Budget. Taught at University of Puerto Rico and Catholic. (Social Sciences)
- CHENEY, JOHN T., (1952). M.A., California. Chief, Literature Division, Public Library, District of Columbia. (Languages and Literature)
- CHURCHILL, ETHAN D., (1950). Ph.D., Catholic. Ecologist and Photographic Interpretation Consultant. (Technology)
- CLARK, L. B., JR., (1949). Glass Technologist, Naval Research Laboratory, Department of the Navy. (Technology)
- CLARK, L. B., SR., (1930). B.S., California. Engineer, Naval Research Laboratory, Department of the Navy. Taught at California, Catholic, and San Francisco Research Laboratory. (Technology)
- CLEMENTS, FORREST E., (1949). Ph.D., California. Consultant, Steward, Dougall and Associates, Inc. Taught at California, Yale and Oklahoma. (Social Sciences)
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- LIEBLEIN, JULIUS, (1954). Ph.D., American. Mathematical Statistician, National Bureau of Standards, Department of Commerce. (Mathematics and Statistics)
- LINN, ALICE C., (1954). M.S., Kansas State. Extension Clothing Specialist, Federal Extension Service, USDA. (Committee on Cooperative Extension Education)
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- LOGAN, CHARLES A., (1947). M.S., Kansas State. Superintendent, Office of Operations, Agricultural Research Center, USDA. Taught at Kansas State. (Agricultural Research Center Committee)
- LOVERIDGE, EARL W., (1946). B.S.F., Pennsylvania State. Assistant Chief, Forest Service, USDA. (Public Administration)
- LUCAS, JOHN S., (1937). Department Security Officer, Office of Plant and Operations, USDA. (Office Techniques and Operations)
- LUTTRELL, DOROTHY M., (1947). Records Manager, Internal Revenue Service. (Office Techniques)
- LYMAN, JOHN, (1951). M.S., Scripps Institution of Oceanography, University of California. Director, Division of Oceanography, Hydrographic Office, Department of the Navy. (Physical Sciences)
- LYNDE, LYDIA A., (1953). M.S., Purdue. Parent and Family Life Education Specialist, Extension Service, USDA. (Technology)
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- MACK, CLIFTON E., (1946). LL.B., Suffolk. Commissioner, Federal Supply Service, General Services Administration. Taught at American. (Public Administration)
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- MASON, CHARLES N., (1943). M.A., Montana. Accountant. Taught at Montana. (Public Administration)
- MATERAZZI, ALBERT R., (1948). D.Ch., University of Rome. Technical Representative and Research Advisor, Litho Chemical and Supply Company, Inc. (Technology)
- MATTHEWS, JOSEPH L., (1952). Ph.D., Chicago. Chief, Educational Research Branch, Division of Extension Research and Training, Federal Extension Service, USDA. (Social Sciences)
- MAXWELL, ROBERT W., (1946). LL.B., Washington College of Law, American University. Commissioner of Accounts, Department of the Treasury. (Public Administration)
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- MCCCLAREN, J. KENDALL, (1946). Chief, Program Services and Special Reports Branch, Agricultural Research Service, USDA. (Languages and Literature; Committee on Publications)
- MCCORMICK, JAMES H., (1946). M.S., Georgetown. Deputy Director, Office of Information, USDA. (Committee on Publications)
- MCDONOUGH, THOMAS J., (1953). M.S. in E.E., Stevens Institute of Technology. Connecting Company Engineer, Rural Electrification Administration, USDA. (Technology)

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- McINTYRE, RALPH G., (1953). LL.B., Columbus. Assistant Chief, Property Management Section, Office of Budget and Finance, USDA. (Office Techniques; Public Administration)
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- MILLER, A. R., (1949). D.V.M., Iowa State. Chief, Meat Inspection Branch, Agricultural Research Service, USDA. (Office Techniques; Public Administration)
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- NEWELL, STERLING R., (1929). M.A., American. Director, Agricultural Estimates Division, Agricultural Marketing Service, and Chairman, Crop Reporting Board, USDA. (Mathematics and Statistics)
- NEWSTEIN, HERBERT, (1954). M.S., New York University. Research Meteorologist, Weather Bureau. (Physical Sciences)
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- NISSelson, HAROLD, (1946). B.S., City College of the City of New York. Chief, Field Methods Research Section, Bureau of the Census, Department of Commerce. Taught at American. (Mathematics and Statistics)
- NOLAN, EDWIN T., (1949). B.C.S., Columbus. Deputy Chief, Accounting and Financial Policy Division, Office of the Comptroller of the Army. (Public Administration)
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- NOWICKI, ALBERT L., (1948). M.C.E., Minnesota. Chief, Photogrammetric Division, Army Map Service, Department of the Army. (Technology)
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- POTTER, W. D., (1952). B.S., California Institute of Technology. Highway Research Engineer, Hydraulic Research Branch, Bureau of Public Roads, Department of Commerce. (Technology)
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- PURVES, C. M., (1926). M.A., Minnesota. Deputy Director, Foreign Agricultural Analysis Division, Foreign Agricultural Service, USDA. Taught at Texas A. and M. (Mathematics and Statistics)
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- RICE, WILLIAM B., (1952). Program Coordinator, Office Methods Division, Department of the Navy. (Office Techniques and Operations)
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- ROMAGNA, JACK, (1943). Administrative Officer (Official Reporter), White House. (Office Techniques)
- ROMERO, FERNANDO, (1951). Ph.D., Universidad de San Marcos. Chief, Vocational Education Section, Pan American Union. Taught at Peruvian Naval Academy and San Marcos. (Languages and Literature)
- ROSFN, S. MCKEE, (1949). Ph.D., London. Chief, Training Branch, Foreign Operations Administration. Taught at Chicago, American, and Roosevelt. (Mathematics and Statistics)
- ROSENZWEIG, BENJAMIN, (1951). B.S.Ch.E., City College of the City of New York. Standards Engineers, Plans and Controls Branch, Office of the Assistant Secretary of Defense. (Technology)
- ROSER, VIRGINIA B., (1950). B.A., Emerson. Teacher of Speech. (Languages and Literature)
- ROSSITER, FRED J., (1949). M.S., Iowa State. Assistant Administrator, Foreign Service and Trade Programs, Foreign Agricultural Service, USDA. (Social Sciences)
- ROWE, HAROLD B., (1947). B.S., Iowa State. Member, Senior Staff, Brookings Institution. (Social Sciences)
- ROWE, WILLIAM H., (1934). M.S., Kansas State. Federal Crop Insurance Corporation, USDA. Taught at Kansas State and Akron. (Public Administration)
- RUPPERT, M. CLARE, (1947). M.A., George Washington. Coordinator, Adult Services, D. C. Public Library. (Languages and Literature)
- RYAN, WALTER F., (1953). Ph.D., Cornell University. Assistant Chief, Office of Statistical Standards, Bureau of the Budget. Taught at Cornell and Colgate. (Mathematics and Statistics)
- SABROSKY, LAUREL K., (1947). M.S., Kansas State. Extension Analyst, Extension Research and Training, Federal Extension Service, USDA. Taught at Colorado A. and M. (Social Sciences)
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- SAILER, REECE L., (1947). Ph.D., Kansas. Entomologist, Agricultural Research Service, USDA. Taught at Michigan. (Biological Sciences)
- SAMLER, JOSEPH, (1953). Ph.D., New York. Chief Survey Officer (Counseling), Vocational Rehabilitation and Education Supervision, Department of Veteran Benefits, Veterans Administration. Taught at American University. (Social Sciences)
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- SAUNDERS, J. A., (1948). B.S., U. S. Naval Academy. Capt., USN (Ret.). Trustee and Lecturer, Institute of General Semantics. (Social Sciences)
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- SAZ, ARTHUR K., (1952). Ph.D., Duke. Bacteriologist, National Institutes of Health, Department of Health, Education and Welfare. Taught at Duke, New York Medical College, and Iowa State. (Biological Sciences)
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- SCHAEZNER, J. P., (1949). B.S., Wisconsin. Agricultural Engineer, Electric Operations and Loans Division, Rural Electrification Administration, USDA. (Technology)
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- SERVESON, EDWIN H., (1951). B.S.C.E., Cooper Union. Supervisory Instructor, Photographic Interpretation Center, Training Department, Department of the Navy. (Technology)
- SHARAR, EARL D., (1949). B.S., American. Administrative Officer, Horticultural Crops Research Branch, Agricultural Research Service, USDA. (Office Techniques)
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- SEIGEL, IRVING H., (1949). Ph.D., Columbia. Co-Director, American Technology Study, Twentieth Century Fund. (Mathematics and Statistics)
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- SIMMONS, LANSING G., (1952). B.S.C.E., Maryland. Chief Mathematician, Geodesy Division, U. S. Coast and Geodetic Survey, Department of Commerce. (Technology)
- SIMMS, D. HARPER, (1952). A.B., B.J., Missouri. Director, Information Division, Soil Conservation Service, USDA. (Committee on Publications)
- SMOOT, MARGARET M., (1952). Editor, Agricultural Research Service, USDA. (Committee on Publications)
- SKOP, JACOB, (1951). Chief, User Requirements and Development Division, Army Map Service, Department of the Army. (Technology)
- SMALL, NORMAN J., (1948). Ph.D., Johns Hopkins. Legal Analyst, Library of Congress. Taught at Johns Hopkins, Hunter, and Catholic. (Public Administration)
- SMITH, CARROLL N., (1954). Ph.D., George Washington. Assistant Head, Section of Insects Affecting Man and Animals, Agricultural Research Service, USDA. (Biological Sciences)
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- SPITZER, H. M., (1946). Dr. Juris, Vienna; B.A., Oxford. Author and Lecturer. Formerly Director, Research Institute of Economic Psychology, Vienna. (Social Sciences)
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- STAUBER, B. RALPH, (1931). M.A., Minnesota. Chief, Agricultural Price Statistics Branch, Agricultural Marketing Service, USDA. Taught at Minnesota. (Mathematics and Statistics)
- STEELE, J. GORDON, (1942). Ph.D., Ohio State. Soil Scientist, Soil Conservation Service, USDA. (Physical Sciences; Correspondence)
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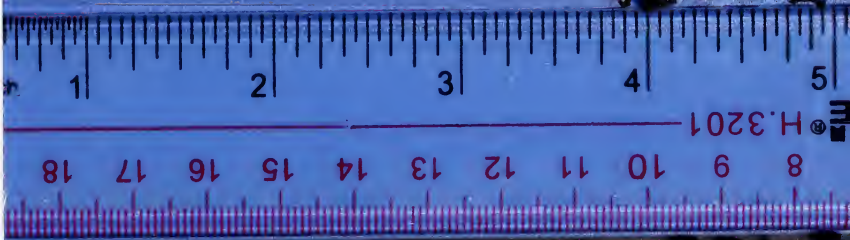
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